

The Analysts Journal

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JUNE 1958

Proceedings

Eleventh Annual Convention

NATIONAL FEDERATION OF
FINANCIAL ANALYSTS SOCIETIES



May 19 to 22, 1958



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Los Angeles

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THE NATIONAL FEDERATION OF FINANCIAL ANALYSTS SOCIETIES



BAYTOWN, TEXAS—This spectacularly growing point, in the past 7 years, has increased its population 49% — *the number of its telephones 67%*. Baytown is in General Telephone Territory.

Places that are "r'aring to grow"

helped build America's second largest telephone system



Here you see in Baytown, Texas, an everyday activity typical of bursting-at-the-seams areas served by General Telephone's 1,745 central offices in 30 states. These fast-growing regions have supplied General Telephone with 2,700,000 new customers in the past 8 years—and are adding about 1,000 more every working day.

General Telephone works closely, too, with most of America's 4,400 other "independent" telephone companies.

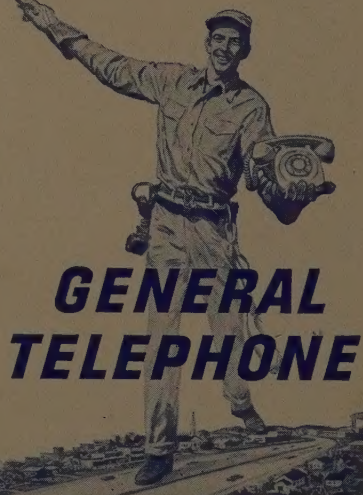
Its manufacturing subsidiaries—such as Automatic Electric—supply them with finer telephones and central office

equipment, that they may provide unexcelled service to *their* customers.

And it is true that the nation's booming expansion must spread into the areas with room for it. Such new growth is rooting itself in General Telephone Territory.

The prospects for General Telephone are obvious—and pleasant: a constantly greater growth through better service to more people.

General Telephone Corporation
260 Madison Avenue, New York



New developments in Celanese Chemicals

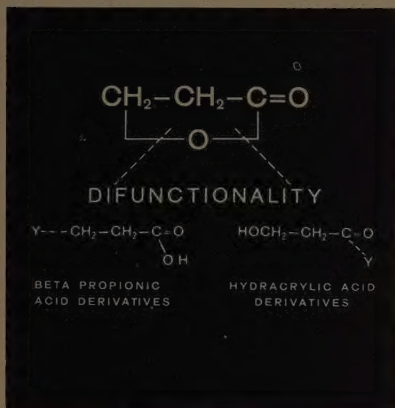
Here are typical examples of how Celanese research and development continue to feed new products to industry, and give them new usefulness by bringing down their prices.



CHEMICAL WITH A BOUNCE

Trimethylolpropane is a chemical with a lusty present and a really big future. It is a prime ingredient in the fast-growing polyurethane foams—used for upholstery cushioning, mattresses, auto crash padding and rug underlays. These foams can also be made rigid for structural and insulation uses.

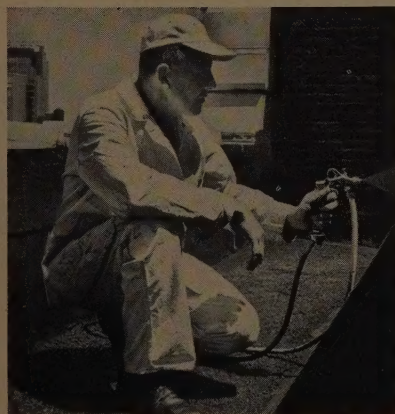
Today, a little more than two years after its introduction, trimethylolpropane is being produced in the world's largest unit—geared to turn out 10 million pounds a year. And, more important, its price has been reduced by more than 50 percent.



AMBIDEXTROUS CHEMICAL

beta Propiolactone, or BPL for short, is one of the latest, and most remarkable developments in commercial chemistry. Produced by a new processing method, this chemical has the interesting ability to combine with other chemicals at either end of its molecular structure to form materials of widely differing chemical makeup. This characteristic is known as *difunctionality*.

Now that industry can get beta propiolactone in volume quantities from Celanese, look for it to be used in textile and leather finishing, paper coatings, adhesives and many other practical applications. Incidentally, BPL is such a powerful sterilizing agent that the military has used it to disinfect entire hospitals as well as electronic apparatus.



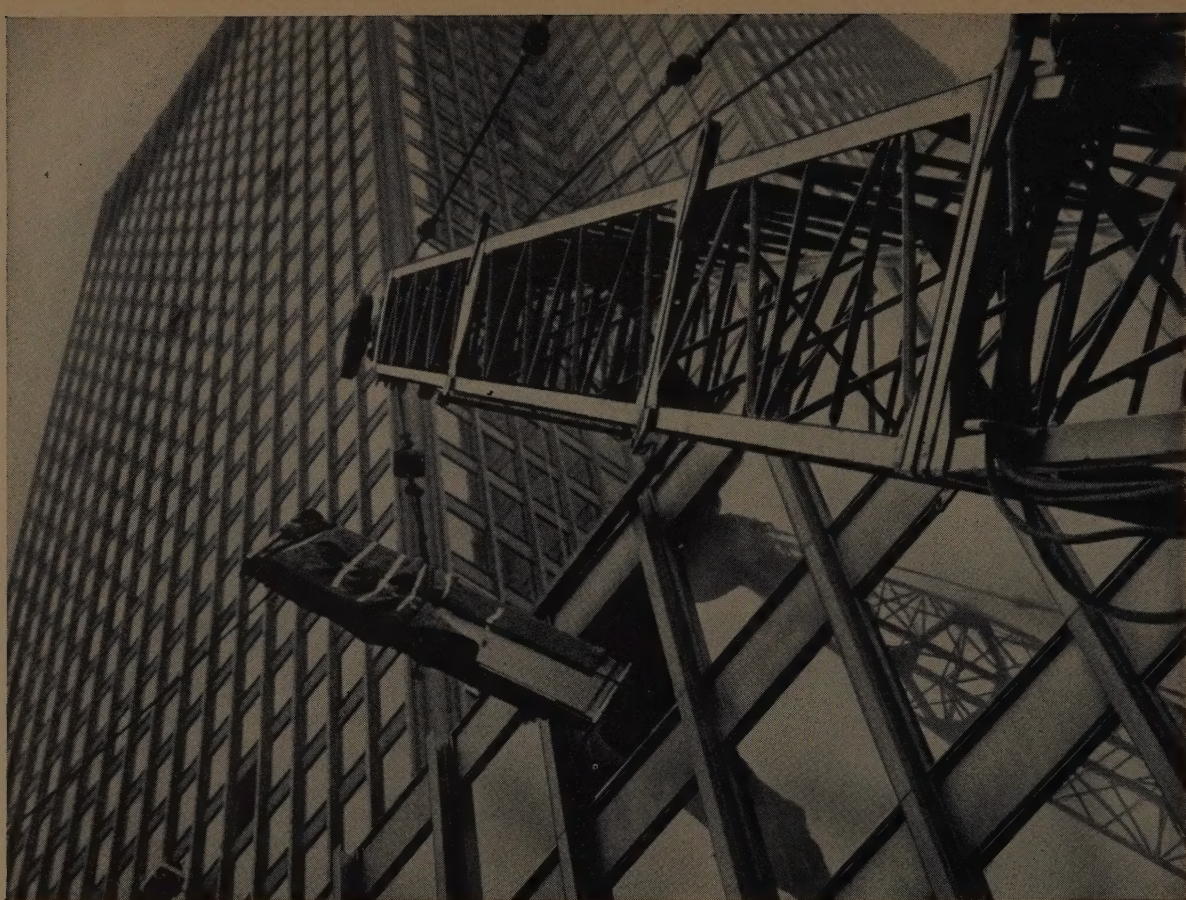
NEW PROCESS SWELLING FAMILY OF MONOMERS

The new *beta* Propiolactone processing method, has added three new acrylates to the Celanese family of monomers. These are called: methyl, ethyl and butyl. Such acrylates are important intermediate materials used in a wide range of manufacturing processes, including coatings, leather (as sealants), textiles (as sizing), plastics, adhesives and water-based paints. These new acrylates increase the diversity of Celanese monomers, further strengthening the company's position as "headquarters for monomers."

Celanese® BPL™

Presenting industry with ever-increasing opportunities for new and improved products and services is a continuing Celanese program.

CELANESE CORPORATION OF AMERICA • 180 MADISON AVENUE, NEW YORK 16, N.Y.
CHEMICALS • PLASTICS • CHEMICAL FIBERS AND YARNS • CELLULOSE



38-story bronze skyscraper at 375 Park Avenue designed by Mies van der Rohe and Philip Johnson. Associate architects: Kahn & Jacobs. General contractor: George A. Fuller Company. Architectural metals fabricator: General Bronze Corp.

BRONZE

Age-old copper alloy in a brand new setting

There's a striking new face adorning Manhattan's skyline these days. It's the world's first bronze building. Radiating warmth and color, the 38-story office building at 375 Park Avenue brings forth intriguing new concepts in building design. Massive masonry walls have given way to lightweight "curtains" of glass and architectural bronze.

For bronze endures and endures . . . ages ever so gracefully. But, until recently, architectural bronze extrusions were unknown in the large sizes needed for a building like this. Formerly, bronze extrusions were confined commercially to those whose cross-section would fit in a six-inch circle.

The extrusion problem was studied intensively by Anaconda's American Brass Company. Working closely with the architects and the architectural metals fabricator, Anaconda men found the answer. Then, as principal supplier, The American Brass Company used its specially designed dies and modern extrusion equipment to produce the 26-foot-long I-shaped bronze mullions and many other extrusions that helped transform a pace-setting architectural concept into a functional and beautiful reality.

Creativity with bronze is just one more illustration of how Anaconda uses its technology to serve industry. Ranging from aluminum to uranium, Anaconda's many areas of endeavor lead the way to ever-expanding uses for non-ferrous metals and mill products . . . and to important attainments in America's pattern of progress.

The ANACONDA[®] Company

The American Brass Company
Anaconda Wire & Cable Company
Andes Copper Mining Company
Chile Copper Company
Greene Cananea Copper Company
Anaconda Aluminum Company
Anaconda Sales Company
International Smelting and Refining Company

WATER, WATER EVERYWHERE

along Great Northern's route!

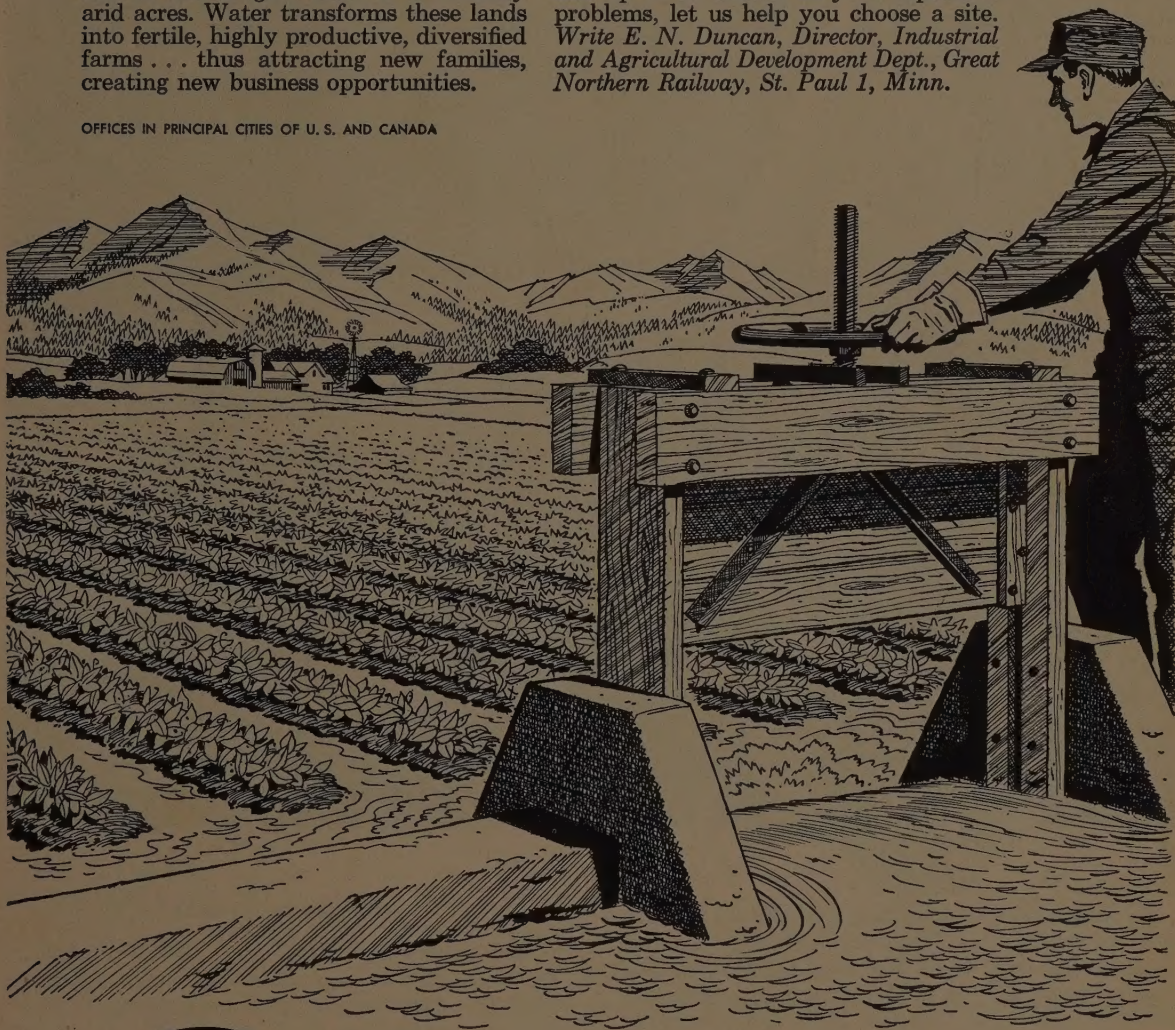
From Lake Superior to Puget Sound, the vast region served by Great Northern Railway is blessed with fresh, pure water—the element so increasingly scarce in many other areas.

Fed by heavy mountain snowfalls... dammed to form huge reservoirs, the mighty Missouri, Columbia and their tributaries now irrigate millions of formerly arid acres. Water transforms these lands into fertile, highly productive, diversified farms... thus attracting new families, creating new business opportunities.

Also springing up are water-hungry new industries: food processing; pulp and paper mills; aluminum reduction plants which require thousands of gallons of water to make a single ton of ingots.

If abundant water and power resources, a wealth of raw materials, unsurpassed transportation, and a growing labor force add up to an answer to your expansion problems, let us help you choose a site. Write *E. N. Duncan, Director, Industrial and Agricultural Development Dept., Great Northern Railway, St. Paul 1, Minn.*

OFFICES IN PRINCIPAL CITIES OF U. S. AND CANADA



Ride the Incomparable **EMPIRE BUILDER** past America's mightiest waters

See the Mississippi River Valley, Minnesota's Land of 10,000 Lakes, the Far West's man-made reservoirs and mammoth dams. See the majestic Columbia River... or ride for miles along Puget Sound. Go in unmatched luxury on the streamlined Empire Builder... every day each way between Chicago and Seattle-Portland. More dome seats. *P. G. Holmes, Passenger Traffic Mgr., Great Northern Railway, St. Paul 1, Minn.*

The night they
remembered Columbia Gas
...with thanks

In one 24-hour period during last February's 10-day cold wave, Columbia Gas System delivered 4.5 billion cubic feet of natural gas — 4½ times the System's first "billion peak day" in 1943. Because of tremendous underground storage facilities, the System was able to meet these cold weather requirements.

Columbia Gas operates 42 underground fields which store billions of cubic feet of natural gas from the Southwest in summer — ready for winter's peak needs. More storage facilities will be required for the future — to meet ever-growing demands of home and industry.

Economy plus performance — the quick story of why natural gas continues to be the preferred fuel throughout the area Columbia Gas System serves.

SUMMARY OF EARNINGS

(12 Months Ended March 31, 1958)	1958	1957
Net Income	\$33,333,000.....	\$29,435,000
Earnings Per Share.....	1.44	1.40
Dividends Paid Per Share.....	1.00	0.97%
Number of Shares Outstanding.....	23,233,000.....	21,198,000

THE COLUMBIA
Gas **SYSTEM, INC.**

COLUMBIA GAS SYSTEM SERVICE CORPORATION
COLUMBIA HYDROCARBON CORPORATION
120 EAST 41st STREET, NEW YORK 17, N.Y.

CHARLESTON GROUP: UNITED FUEL GAS COMPANY, 1700 MACCORKLE AVENUE, S.E., CHARLESTON, WEST VIRGINIA. **COLUMBUS GROUP:** THE OHIO FUEL GAS COMPANY, 69 NORTH FRONT ST., COLUMBUS 15, OHIO. **PITTSBURGH GROUP:** THE MANUFACTURERS LIGHT AND HEAT COMPANY, 800 UNION TRUST BLDG., PITTSBURGH 19, PA.

The Analysts Journal

JUNE
1958

Message from the Federation President

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VOLUME 14
NUMBER 3

THE 11th Annual Convention in Los Angeles is now history. We of the Los Angeles Society welcomed the opportunity of being hosts, and while many hours went into the planning and arrangements, we were fully compensated if its sessions and field trips were found instructive and constructive by those attending.

Looking to the year ahead, with the cooperation I am sure to receive from the other officers and committee chairmen, it is my hope that the Federation will continue the increase in professional prestige that has characterized recent years. Former officers and chairmen have done a good job in bringing the Federation to the stature which it now enjoys, but continued advancement is always desirable.

Ten years ago the Federation consisted of only five Societies, compared with the twenty-two of today. Doubtless other groups will qualify for affiliation with the Federation, but we must be certain that a high professional standard for membership is maintained.

A. Moyer Kulp's Committee on Professional Ethics and Standards has done a great deal of work on the question of certification of analysts. While a program such as the committee has recommended be made effective involves solutions to many problems, there seems no question that the principle has a great deal of merit and is deserving of careful consideration.

Particular mention should also be made of the continued growth in stature of the Analysts Journal. Our publication has consistently contained material of a high type and its editorial and business staffs deserve the gratitude of our entire membership for their successes.

The Investments Analysts' Seminar under the direction of Hamilton Bolton and Marshall Ketchum has likewise established an enviable reputation in furthering professional education. It is certain that this activity of the Federation will continue to increase the prestige of our organization.

With all of these past accomplishments, our challenge is to make still further advancements. Gilbert Palmer, Robert Wilkes, Shelby Davis and the other past presidents, together with their fellow officers and committee chairmen, have achieved a plane which will be difficult to equal. Their efforts and hard work in behalf of the Federation deserve the thanks of all of us. It is an honor to have the opportunity of trying to carry on their successes, and with the support of all of our constituent Societies we will be able to meet this goal.



L. HARTLEY SMITH

L. Hartley Smith

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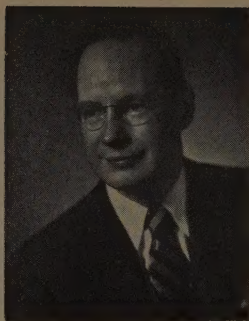
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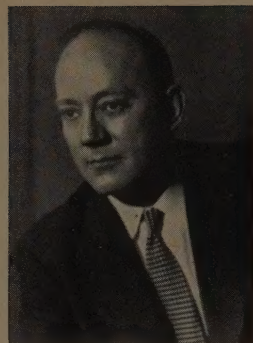
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Proceedings Eleventh Annual Convention

National Federation of Financial Analysts Societies

MAY 19 - 22, 1958

HOTEL STATLER, LOS ANGELES

Convention General Chairman, Richard M. Link

EDITORIAL

Message from the Federation President *L. Hartley Smith* 5

OPENING MEETING

A. Hamilton Bolton . *Chairman*
Welcome to Los Angeles *Richard M. Link* 11
Reviving the Growth of United States Economy *Dr. Neil H. Jacoby* 11
Growth of the West *Conrad C. Jamison* 14

STOCK MARKET LUNCHEON

L. Hartley Smith . *Chairman*
The New Speculation in Common Stocks *Benjamin Graham* 17

ELECTRONICS—SYSTEMS AND INSTRUMENTS

Wesley F. Jones . *Chairman*
Management of Research and Development Programs *David Packard* 23
The Nature of Industrial Instrumentation,
Its Application and Marketing *R. T. Silberman* 25
Factors Affecting Profit in the Scientific Instruments Business *Philip S. Fogg* 29

MISSILES AND SPACE TRAVEL

Dwight C. Baum . *Chairman*
The Future of the Manned Aircraft *Hall L. Hibbard* 35
Development and Manufacturing Problems *J. R. Dempsey* 36
Space Flight *Dr. Louis G. Dunn* 37

AIR TRANSPORTATION

Bruce Graham . *Chairman*
The Air Transportation Industry and Its Regulatory Climate *Stuart G. Tipton* 39
Regional Airlines, Their Problems and Outlook *Terrell C. Drinkwater* 43

FOREST PRODUCTS INDUSTRY

James N. Lamb . *Chairman*
Prospects for the Paper and Board Industry *D. O. Bowman* 47

ELECTRONIC COMPONENTS

Marvin W. Drew . *Chairman*
Introduction to the Components Industry *Phillip W. Zonne* 52

BANKING AND CREDIT

Carl G. Gebhart . *Chairman*
Outlook for Bank Earnings *Clifford Tweter* 55
Finance Companies in Today's Economy *Elliott Taylor* 57
California Municipal Bond Financing *Alan K. Browne* 59

ELECTRONIC COMPUTERS

Robert W. Houston	<i>Chairman</i>	
The Manufacturer's Viewpoint		James R. Bradburn 67
Application of Computers to Scientific Management		Herman C. Heiser 70

GAS AND ELECTRIC UTILITIES

Donald Merris	<i>Chairman</i>	
Prospects for Electric Utility Companies on Pacific Coast		James F. Davenport 75
Energy Requirements and Regulations		Robert A. Hornby 78
Outlook for Electric and Gas Utility Industries		P. P. Stathas 82

ANNUAL DINNER

Gilbert H. Palmer	<i>Chairman</i>	
Exploring the Tomorrows		Frank Pace, Jr. 89

ELECTRONICS INDUSTRY

Robert W. Anderson	<i>Chairman</i>	
A Summary of the Past, Present, and Future		Charles B. Thornton 93

OIL INDUSTRY

Coleman W. Morton	<i>Chairman</i>	
The International Outlook for Oil		Elmer Peterson 97
Crude Oil Reserves		Everett G. Trostel 100
Petroleum, an Industry in Transition		Fred L. Hartley 103

FIELD TRIPS

A. Western Air Lines—Stauffer Chemical Co.— Titanium Metals—American Potash & Chemical Corp.— U. S. Borax & Chemical Corp.		Jon Lovelace, Jr. 109
B. Douglas Aircraft—Beckman Instruments		Will Richeson 112
C. Fibreboard Paper Products—Ford Motor Co.		Wilton M. Adams 112
D. Rheem Manufacturing—Hoffman Electronics		W. Jay Maguire 114
E. Kaiser Steel Corporation— California Institute of Technology		Augustus Slater, Jr. 114
F. Lockheed Aircraft—General Controls Co.		John M. Bush 115
G. Riverside Cement Company		Harl Phelps 116
H. Consolidated Electrodynamics Corp.— ElectroData Division, Burroughs Corp.		Harry Rossi 117
I. General Dynamics Corporation		William F. Phillips 119
J. Litton Industries—Servomechanisms		Sheldon M. Collins 119
L. Columbia Broadcasting—Metro-Goldwyn-Mayer— Twentieth Century-Fox		James R. Comeskey 120
M. National Broadcasting Co.—Paramount—Warner Bros.		Robert C. Cray 121
N. North American Aviation		Ernest V. Stowell 122
The Special Train Trip		Barbara C. Jones 125

The Proceedings of the Eleventh Annual Convention of the National Federation of Financial Analysts Societies, held at Los Angeles on May 19, 20, 21 and 22, is useful to all persons interested in finance and economic development. It includes virtually all papers and descriptions of field trips. Some are by choice of the authors not printed; others were not sent to us in time for publication. This issue presents a wide coverage, and is, we think, of great importance. Due to illness most of these proceedings were not edited by Helen Slade; they have been done in large part by Henry Sanders.

Serving the Automotive Industry



EAGLE-PICHER / Manufacturer's Manufacturer

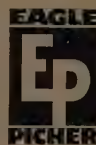


In the automotive field we're regarded as unusually adept at manufacturing many molded and extruded parts that go into today's cars. That's one of our specialties as a "manufacturer's manufacturer."

In particular, Eagle-Picher's Ohio Rubber and Fabricon Products Divisions produce many millions of plastic and rubber automotive component parts every year. These include motor mounts, weather-stripping, seals, housings, floor mats, door trim panels and many other essen-

tials. Eagle-Picher is geared to automobile production and is uniquely equipped to keep pace with the assembly lines of this giant industry.

As a "manufacturer's manufacturer," Eagle-Picher serves such industries as paint, food packaging, ceramics, steel, appliances, electronics, petroleum, agriculture and others. Over many years we have proved that our experience in manufacturing and research successfully supplements that of our customers.



SINCE 1843 THE EAGLE-PICHER COMPANY, GENERAL OFFICES: CINCINNATI 1, OHIO



THIS YEAR

THE BELL SYSTEM IS PUTTING MORE THAN TWO BILLION DOLLARS IN NEW FACILITIES

We are doing this because we are confident that growing America will need, buy, and use more telephone service tomorrow than today.

We are doing it to improve our service further and make the telephone even more convenient. This we are sure will stimulate more use.

These 1958 expenditures are higher than the average in the post-war years—and close to the highest in any year.

A stimulus to the economy of the whole country

Our goal, as I have said, is to serve you better than ever. In addition, the way this money flows out to other businesses stimulates the economy of the whole country.

Wherever there are new telephone buildings going up, or jobs of maintenance, there is work for local builders, carpenters, plumbers, electricians, painters and many others.

Our spending means business too for thousands of other companies and workers in those companies. Last year the Bell System through Western Electric, its manufacturing and purchasing unit, bought from 33,000 firms throughout the country. Nearly nine out of ten of these are small businesses, each with fewer than 500 employees. This year again we expect to buy about a billion dollars worth of goods and services from other industries.

To go ahead with our 1958 construction, we in the Bell System have raised nearly a billion dollars of new capital in the last six months. Obviously, in-

vestors will continue to entrust their savings to us only if they can expect reasonable earnings on the money they risk.

Good service at reasonable profit keeps the road to progress open

So telephone progress—and the advantage to all that comes from our pushing ahead—begins with our faith that Americans want good and improving service at prices which allow a fair profit.

This is the way of life which in our country has stimulated invention, nourished enterprise, created jobs, raised living standards, and built our national strength. As long as we live by this principle, the future of the telephone is almost limitless in new possibilities for service to you.

FREDERICK R. KAPPEL, PRESIDENT
AMERICAN TELEPHONE AND TELEGRAPH COMPANY



OPENING MEETING

Welcome to Los Angeles

RICHARD M. LINK
Convention Chairman

GOOD MORNING, ANALYSTS AND GUESTS. All of us in the Los Angeles society offer you a warm and hearty welcome to this Eleventh Annual Convention of the National Federation of Financial Analysts Societies. It is gratifying to us as hosts to see so many of you who have traveled so far from so many parts of the United States and Canada to be here today. We have arranged our program to show you the economic importance and the large industrial potential of Southern California. We are sure you will receive a rich return on your investment to come here. In order to realize the maximum benefits from this convention, however, we must keep closely to our tight time schedule, and I ask your cooperation.

This is not the first time some of you have visited Los Angeles in connection with an analysts' convention. Six years ago, the San Francisco society graciously included us at the end of the regular convention. This year we are able

to reciprocate and you have the opportunity of taking an interesting trip through the Napa Valley under the sponsorship of the San Francisco society this coming Saturday.

Last year's convention in Cleveland was said by many to be the greatest ever held. We have been faced with a real challenge to live up to the standards set by the Cleveland society, but we think you will find this convention equally stimulating. And now I would like to introduce a gentleman from Cleveland who had much to do with the success of that convention. He in turn will present the national officers elected last night who will take office on June 30. Our national president—Mr. Gilbert Palmer of Cleveland.

(Mr. Palmer introduced the newly elected officers of the National Federation, and then was followed by the next speaker, Dr. Jacoby.)

Reviving the Growth of the United States Economy

DR. NEIL H. JACOBY
Dean, Graduate School of Business Administration, U.C.L.A.

YOU MAY HAVE HEARD the story of the panhandler who accosted the banker on the street and asked him for a dollar. The banker said: "My good man, a dollar is a lot of money. Now, if you would ask a person for ten cents or twenty-five cents, you might have a better chance of getting something." Look," said the panhandler, "either give me the dollar, or don't give it to me, but please don't tell me how to run my own business!"

Well, I am not going to tell you security analysts how to run your own business. I shall not advise you whether stock prices are high or low, and which ones will go up or down. Nevertheless, I have a little more justification for telling you how to run your business than the banker in this story, because at one time I had a brief turn as a securities analyst. Back in the late thirties I was associated with Lawrence Stern and Company in Chicago. My salary was

about \$45 a week and I am sure I was worth every cent of it. My term of office began just as the sharp recession of 1937-1938 set in. I may say that this experience has made me, if not a wiser economic forecaster, at least a much more cautious one!

I should like to speak to you this morning on the subject of reviving the growth of the United States economy. I have chosen that title rather deliberately. It seems to me that reviving the growth of our economy is the key problem of economic policy we face in this country. Let me just sketch at the outset the course of my reasoning. And then I shall probe a little more deeply into each of the elements of it.

I think the current recession is probably very near its end. And, therefore, we do not face the problem of stemming a decline. But the problem of promoting a vigorous

recovery is a different kind of problem than that of halting a recession. In our present circumstances, it is my belief that we could very well have a prolonged period of slow and halting recovery. If, as it now appears, the gross national production of the United States for 1958 as a whole will fall about ten billion dollars short of gross national production of 1957, this would be the second year of very slow growth or decline in the real output of United States economy. Normally, our economy grows—and I am speaking here after deflating for price changes—about 3½% a year. In the years since World War II this has been the rate of growth that we have been able to maintain on the average. During 1957, our growth in real output after you correct for price inflation that occurred was under one per cent. Even 1957 was a subnormal growth year. Now in 1958 we are faced with a decline which I estimate at something around 2%. And that presumes a modest recovery before the end of this year. We cannot expect a free enterprise economy to grow at an even rate. Nevertheless, I say this record is a cause of concern and not of satisfaction. Americans are failing to enjoy the rising living standards that normal growth would make possible. We are losing today around 30 billion dollars a year of product on an annual basis.

More important still, the subnormal growth of the United States economy is weakening our diplomatic and military position in the world. It is weakening it by failing to provide expanding markets for an expanding Free World economy. I have only to call to your attention some very recent episodes to indicate the difficulties this is creating for us. We know what happened in Canada at the recent election. We have heard the growing criticism of American economic policy by our good friend and neighbor to the north. We saw what happened in Latin America during the so-called "good-will" tour of Vice President Nixon. By offering unstable and shrinking markets for the raw materials of many of the nations of the world, we are making it harder for them to associate themselves with us in a trading network. Thus we are creating problems for our national security. That is why strong economic growth is desirable on other grounds than that of merely enabling us to enjoy a better standard of living.

I conclude, therefore, that it would only be the part of prudence for our Government to take appropriate steps to increase the rate of growth of the United States economy. This means steps that would foster an enlargement of private demand by households and businesses for goods and services. It also means steps that will involve the creation of greater public demand on the part of our state and local governments. The taking of these measures—and I am speaking here of programs of public investment and of tax reductions—will require a somewhat more enlightened public attitude toward governmental policy than exists at the present time.

Now, let me enlarge on this thesis a little.

My first point is that the most serious economic decline since 1945 is probably ending. Assuming that the annual rate of production will be about \$420 billions during this current quarter year, versus \$422 billions in the first quarter of 1958, and assuming further this quarter will mark the

bottom of the current recession, the total decline that we have seen in this recession (on a quarterly basis) is about 4½%. That compares with a decline of 3.7% over three quarters of a year during the recession of 1948-49, and with a decline of 3.3% over two quarters during the recession of 1953-54. In other words, we have had the most serious decline percentagewise, measured in terms of quarterly GNP rates, that we have had since World War II.

Now, you may say, why should one believe that this decline is probably at or near its end? I think the major reason for being hopeful that the decline is near its end is that the annual rate of inventory depletion has recently been very high. Something between ten and twelve billion dollars per annum in annual terms. And as long as retail sales hold steady, as they have been holding, the time is near when the rate of production will have to rise closer to the rate of consumption. We have been eating up inventories at an unsustainable rate. This is my main reason for thinking that the decline in aggregate economic activity is probably at or near its end. Consumer incomes and consumer expenditures in the aggregate have been holding very steadily near the levels of a year ago, as you know. This reflects not only the effect of the "built-in" stabilizers on consumer income, and the savings or liquidity that American consumers have built up; it also reflects a maintenance of a good level of confidence in the future. In the meanwhile, governmental demand for goods and services by Federal, State and local governments is beginning to rise slowly. The emphasis here needs to be on the word *slow*, because the rise has been so far quite slow and, as I see it, it will continue to be so.

This brings me to my second point, that a *rapid* general economic expansion is unlikely. The first fact I should like to call to your attention is that recoveries from past recessions during this post-war period have been rather slow. I measure recovery from the quarterly low in the annual GNP rate to the quarter in which the GNP rate has moved into new high ground. In the recession of 1948-49, *three* quarters passed after the low quarter before GNP moved into above previous peak. In the recession of 1953-54 *five* quarters elapsed after the low point before the GNP rate surpassed the previous peak. I think this is the fairest definition of what we mean by "recovery." So that even on the basis of historical analogy I think we cannot expect a rapid recovery.

But historical analogy can often be a treacherous guide. There are, I think, four additional reasons for believing that the period of recovery from the current recession may be even more prolonged than it was during 1949-50 or 1953-54. The first of those reasons is that the extent of the decline in total economic activity has been greater. I have already given you the figures on that, and the point is self evident. It may take longer to climb out of a deeper pit than it does out of a shallower one.

The second reason why a rapid revival seems unlikely is that business expenditures on plant and equipment had already fallen by 14% in the first quarter of 1957, and the prospect is for a continued decline in this sector of demand. History reveals that capital spending cycles by business do not end their contraction phases quickly, once they have

gone into them. And this contraction phase, so far, is only three quarters old. More important is the fact that the demand for a good many kinds of capital goods seems "tired." The current level of capacity in a number of key industries which are heavy buyers of capital equipment, notably steel, aluminum and motor vehicles, has anticipated future growth requirements some time in advance. While this will not adversely affect the demand for modernization or replacement, it certainly will adversely affect the demand for expansion of capacity.

Even more important than the two factors I have mentioned, as leading to a somewhat sober view about the trend of business capital expenditure, is the drop in business profits. The drop in business profits apparently has been sharper than in any recession since World War II. This drop in profits tends to depress the prospective yields of new investments, and that makes businessmen somewhat more jaundiced in their attitude toward new capital investments. Also, it adversely affects business ability to finance plant and equipment purchases, because many businesses must depend wholly or in considerable measure upon retained profits for that financing. I estimate that, from a peak of nearly 42 billions in the third quarter of 1957, corporate profits before taxes have fallen to a figure that may be as low as 30 billions in annual rate at the present time. We do not have, of course, the final profit figures even for the first quarter of this year. My estimate is based on scattered evidence; but I suspect is not too far out. If this estimate is correct, the profit decline in the current recession has been about 28%. This compares with a maximum decline of 25½ in the 1948-49 recession, and with a maximum decline of 23% in the 1953-54 recession. This drop in profits is, I believe, an important factor tending to further reduce business expenditure on plant and equipment, which, in turn, is an important factor in the total economic outlook of the nation.

The third reason why I believe a rapid revival is unlikely is that Federal Government action to stimulate private demand by monetary relaxation has, so far, been less extensive, and has come much slower than it did in previous post-war recessions. This has had the effect of deferring the time at which a substantial reduction has come in long-term money rates, and deferred the time at which we expect monetary policy to make a large contribution to recovery.

The decline in business began in August 1957. Nearly three months elapsed before the Federal Reserve shifted from a policy of credit restraint to one of passive ease. And four months passed before there was a definite policy of active ease. Discount rates were lowered substantially, but that has not had a great deal of effect by itself. Only last month was a substantial move made to free-up lending power in the commercial banks by dropping legal reserve requirements by one percentage point for all classes of member banks. Previous reductions in legal reserve requirements were of a lesser quantity. Today, we find the total money supply—by which I mean the demand deposits plus currency in circulation—is actually somewhat less than it was a year ago. And total Federal Reserve bank credit outstanding in the form of its holdings of Government

securities and bankers' acceptance is about the same as it was a year ago. While the reserve position of the member banks has shifted from one of about half a billion dollars of net borrowings from the System to one of about half a billion dollars of "free" reserves, this has been a very modest shift under the circumstances.

The Federal Reserve authorities have been understandably concerned with the need to forestall new inflationary movements in the price level. But I think they have failed to distinguish between two important causes of lift in the Consumers Price Index. One is inflation arising out of *currently excessive* demands for goods and services, and I think no one will argue that the United States economy is anywhere near this position today. The other is that kind of inflation of the CPI which arises out of *past* agreements or contracts. Examples are relaxation of rent control, readjustment of public utilities rates, escalation under old labor contracts, and so on. The only kind of inflation we have had for a year is of this latter kind. This is not a proper guide to monetary policy. Because of this delay in shifting flexibly to a position of credit ease, and failing to put the banks in a very highly liquid position, the long-term interest rate has only recently come down. Therefore, this will delay the favorable effect that a reduction of interest rates will have on investment.

The fourth reason why I think that a strong and early revival is somewhat unlikely is that consumer spending is *not* likely to boom at an early date. The economy was lifted out of the recession of 1954 by a boom in consumer spending on automobiles and other durables, as well as by a strong lift in capital spending by businesses on plant and equipment. I think that we cannot reasonably expect consumers to generate a new boom in autos or on housing, or on durable goods associated with housing, for some time to come. In the first place, until about 1960 there will continue to be a low rate of family formations, in consequence of low birth rate before and during the Second World War. Of course, the number of family formations is only one determinant of the demand for housing. Personal income, housing costs, and the terms of housing credit being other important factors. However, as we look back on our postwar history in housing, the two dynamic factors have been, first of all, the terms of housing credit, and, secondly, the rate of new family formation. It seems to me that we have stretched the terms of housing credit about to the breaking point. We cannot expect much further stimulus from this source. And, with the rate of family formations likely to be low for a few years, we cannot reasonably expect a new housing boom. A housing boom usually carries with it an active market for furniture, appliances and other durable consumers' goods which are associated with the home.

We are now living through a similar distortion in automobiles. We are in the period when the non-existent cars of the war years would have been in those age brackets with the highest junking ratios. For a few years, therefore, replacement demand for cars is likely to be low. It would take a fantastic increase in the aggregate auto population to produce another 7½ million car year. I think this most unlikely. The outlook is for a moderate rise in aggregate

consumer expenditure—certainly nothing to be alarmed about—but we cannot expect to lift the economy sharply by a new consumer expenditure boom.

All this does seem to suggest that it would be the part of wisdom for Government to take some actions designed to stimulate the growth of total demand in the United States economy. To the maximum extent, Government should try to stimulate private demand. To the extent that we have needed programs of public works and other public expenditures, it would seem that this is a good time in which to plan for and initiate those expenditures. This is a time when active private demand is not getting in the way of, and competing with, public demand and generating inflationary pressure. We do have some slack that Government can very well help to take up. It is in this context that we should consider objectively such questions as an increase in total governmental expenditures and a reduction in taxes.

I have already proposed, and I still consider highly desirable, a tax reduction at the current juncture. In my own thinking, a "package" tax cut of around 5 billion dollars in revenues would be desirable. It would be composed of an elimination of the Korean War increases in the automobile and certain other excises. It would involve a reduction of the corporate tax rate from 52 to 47%, as is now scheduled for July 1, 1958. It would also embrace about a 7% cut in personal income taxes across the board, representing a very good program. Under current circumstances, I would lay greatest weight on the desirability of a cut in the corporate income tax. This is a time when we should be considering how to stimulate the growth of the United States economy for many reasons, both domestic and international. One of the most hopeful ways of doing this is to encourage enterprise; to encourage our businesses to engage in research and development expenditures; to stimu-

late businesses to equip themselves in the most efficient possible ways, and to maintain high levels of capital spending. A cut in the corporate tax rate would, I believe, have a more salutary effect in curbing the present decline, in leveling it out, and perhaps in generating a rise, than would any other form of tax reduction.

So far as public demand is concerned, I feel that the country does need bolder and faster action than we have had to accelerate national security program. This should be done not merely because it would help stop a recession, but because the national security needs strengthening. When we look at national security spending since World War II we find it has been the single most unstabilizing element in aggregate demand! There has been nothing in the United States military situation that has called for such instability. It has reflected simply an absence of true, long-range national security planning. A facing-up to the fact that this so-called cold war in which we find ourselves is likely to continue for a generation or more.

Let me just conclude by saying that, while I have drawn attention to certain sobering factors in the outlook, I do not wish to associate myself with the "prophets of gloom and doom." I do not assert a failure to reduce taxes or to take a more positive attitude toward programs of public works and in national security is going to lead to economic catastrophe. I have great confidence in the basic strength of our economy, and in its ability to resume economic growth in the long run. During the years immediately ahead it is clear that Federal, State and local spending will be rising by 6 to 7 billion dollars the year. In the face of this, one cannot see a deep recession. Our real choice, I repeat, lies between a slow and halting recovery, on one hand, and a resumption of a rapid rate of economic growth, on the other. All I am saying is that, if we can have the latter, why ought we to be satisfied with the former?

Growth of the West

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IN PUTTING TOGETHER the factual background for these comments, I reviewed quite a bit of statistical data, and made a number of computations. In the process I was constantly reminded of the hazards of such statistical juggling. Possibly you are aware of them also. I recalled the story which came out of Russia a few years ago. It was shortly after Stalin had died and before his associates had removed the halo from around his head. Moscow radio announced that 5,000,000 Russians filed past Joseph Stalin's coffin in 72 hours. That means, according to the calculations of a very literal-minded statistician, that the mourners, two abreast, 3-1/3 feet apart, ran past the coffin at 22 miles

an hour. Twenty-two miles an hour is 9.3 seconds a hundred yards, which is the world's record for the 100-yard dash. This was heretofore recorded only by America's Mel Patton, and now shared by 5,000,000 Russians. You can see the hazards of juggling with figures, and I hope that when I have finished these remarks you will not feel that I have had you going past the coffin at 22 miles an hour.

Actually, the cold, sober facts about the growth of the West do sound a little bit like Russian statistics. Before I get into that, however, I am going to put in some of the howevers, so I will not be accused of being strictly a Chamber of Commerce representative.

To begin with, to talk about the west as a unit, of course, is improper. It is not one economic unit. It is many, many different areas with many different characteristics. You can hardly lump together Billings, Montana; Phoenix, Arizona; Salt Lake City, Utah; Las Vegas, Nevada; Pocatello, Idaho; Albuquerque, New Mexico, and Los Angeles as if they were one and the same area, and having the same characteristics and growth patterns. So we certainly recognize the fact that this is not a homogeneous area, that there are major differences between areas, and obviously I cannot discuss all of them. Of necessity, I am going to make a few generalizations and then try to focus more or less upon the Los Angeles area. I am doing that for a variety of reasons. In the first place, the Los Angeles area has been the fastest growing metropolitan area in the nation, and is one of the easiest to dramatize. It is, of course, the largest metropolitan area in the West. It is the area with which I am most familiar. And, of course, because of your convention here, possibly you are a little more interested in this area than you might otherwise be. So I am going to turn the spotlight largely upon the Los Angeles area.

Growth is a good thing. You can hardly gainsay that. Up to a point, growth provides a dynamic, vital quality to an area. It provides opportunities for profit. It provides an atmosphere that encourages enterprise, innovation and invention. It provides opportunities for new companies, new products, new ideas, new techniques. It stimulates creative design. But we recognize that in many areas and in many respects we have grown too fast for our own good. We have incurred a lot of liabilities, along with the benefits of rapid growth. We have had a difficult problem in keeping up with this growth, and in keeping on top of it—and very often we do not keep on top of it. In terms of providing school facilities, water supplies, sewage disposal, freeways, correctional institutions, fire and police facilities—things of that nature are very difficult to keep up with. We have had problems of traffic congestion, public transportation and smog—that bad word! (Parenthetically, I might say that despite all the publicity about smog, I am inclined to believe that it has not affected the growth of this area. I have seen no statistical evidence of it.) We have the problems of absorbing hundreds of thousands of new residents into responsible citizenship—and that isn't always easy. We have the fiscal problems that tend to haunt rapidly expanding communities. We have a situation, for example, in Orange County where school enrollment has more than tripled since 1950. Think of the problems that they have faced and are facing in terms of providing school facilities and recruiting teachers, etc., and the fiscal problems that go with that—particularly in some of the rapidly growing residential communities where they have little industry and consequently do not have that additional tax base to help carry the load. So there are a number of problems that come with very rapid growth. We recognize those problems and we have been wrestling with them.

We recognize that there is an optimum rate of growth. That is a nebulous concept, and possibly an optimum rate of growth might vary from one area to another and from one time to another. But I am convinced that an ideal rate of growth would be something in excess of the "natural in-

crease"—in other words, growth beyond the excess of births over deaths in the resident population. If an area is growing less than its "natural increase", it is losing its young people to other areas. It is educating its young people only to have them grow up, reach the productive years, look around—and not finding job opportunities—move to some other area. So that it means that you lose these vital, enterprising young people. You have had the expense of educating them, they reach the stage at which they can be productive, and they go elsewhere to build careers. So obviously, it is a critical situation for any area if it fails to grow at least as fast as its "natural increase". But I submit that an optimum rate of growth is one that includes all the natural increase, plus a reasonable margin over that. We like growth here in the West. We have had a lot of it. My personal opinion is that an optimum rate of growth for us would be this "natural increase", which in this area averages about 1.6% per year, plus another 1% to 1½% per year. In other words, a growth in terms of 2½% to 3% per year. You might say that's a rather rapid rate of growth. Actually it is below what we have seen. The population of the West as a whole has tended to expand by 3% to 3½% per year. The Southern California area has shown gains of over 4% per year in most recent years. Possibly a little too fast for our own good.

As I mentioned before, one of the real problems that many areas of the country have faced is losing their young people. And one of the greatest advantages that we in the West have had is getting these young people. They are a tremendous asset. We can talk about importing capital, importing various goods, but our most important import by far is young people—educated young people, all ready to go, ready to carve out their careers and ready to really contribute to the economy.

In many circles there is a tradition to the effect that old people come to California. They come out here to spend their declining years in the sunshine, to retire on the accumulated wealth of their productive years, or to get generous old age pensions. But the facts just do not substantiate that belief. Quite the contrary. Migration to this area has been, is, and, I am sure, will continue to be young people, people in their 20's and 30's predominantly. In-migration reduces the average age of the population. The in-migrants to this area have a lower average than the population as a whole. There is a smaller percentage of people over 65 among the in-migrants than in the resident population. So our in-migration is to a considerable extent of younger people, educated, trained and ready to carve out careers for themselves. That keeps us young, enterprising and vigorous.

The basic lures that bring people here are climate, the "California way of life", and the old tradition of "go West, young man, go West". But those things would not be very effective if jobs were not available when the people come here. So while the basic lure is climate and all those other intangibles, the thing that has really made California grow is the availability of jobs. When jobs are not being created—and temporarily they are not, because of the business recession—our growth slows down. But it does not come to a halt!

We have had a "fabulous" growth—and I do not apolo-

gize for that Hollywood adjective. Let me quote a few figures. From the pre-Korea year 1949 to 1957, the 11 Western States have accounted for 26% of the national increase in manufacturing employment. California has accounted for 20½% of the national gain, Southern California for 17½% and the Los Angeles Metropolitan area for over 14%. In other words, the Los Angeles area has accounted for one out of every seven additional jobs created in the manufacturing field during recent years.

For data on retail sales, let us consult the Sales Management estimates. Sales Management does a responsible job of estimating and reporting. They have no axes to grind. They estimate that in 1957, for the first year in history, the Los Angeles Metropolitan Area exceeded the Chicago Metropolitan Area in retail sales, and exceeded the Chicago area by 5%. I am not going to say that their figures cannot be off, maybe they are off a few percentage points. It is even conceivable that they could be off by 5%, so that instead of being 5% ahead of Chicago in 1957 the Los Angeles area might have been just even or slightly below. I think this area actually is slightly ahead of Chicago, and in second place nationally. Regardless of details, the trends have been very much in that direction, with the Los Angeles area moving ahead much more rapidly than any of the other metropolitan areas of the nation.

In terms of numerical growth, the 11 Western States account for: the leading area of the United States, Los Angeles; the 6th area, San Francisco; the 9th, San Diego; the 12th, San Bernardino-Riverside; the 16th, Denver; the 25th, Portland; and the 26th, Seattle.

On the 31 metropolitan areas in the nation accounting for more than 5,000 new dwelling units each in 1957, the West accounted for 9. Los Angeles was well in first place, San Francisco in 6th place, San Bernardino-Riverside in 8th, San Diego 9th, San Jose 12th, Phoenix 15th, Denver 21st, Seattle 23rd, and Sacramento 31st. So many sections of the West have had real growth. It hasn't all been concentrated in the Los Angeles area or in Southern California. Arizona, for example, has grown faster percentagewise than California.

As I mentioned before, our greatest import to California is people, particularly young people. Possibly our second most important import, and one on which we are heavily dependent, is capital. The growth of the West would be impossible without the capital provided by the balance of the country. We are not so naive as to think we could do this all by ourselves, that we have the resources to do it. We know that the only way we can attract capital from the rest of the country is by providing real profit opportunities here. Our growth in all categories has been heavily dependent upon imported capital. A large percentage of our industrial expansion has been new plants and the expansion of existing plants by Eastern and Midwestern concerns. They have come to California to tap the tremendous mar-

ket that we have out here. It is a market which in recent years seems to have reached a critical size—like reaching that critical size where a chain reaction begins. And certainly up to a year ago when this recession got under way, that reaction seemed to be going at a furious pace. It was triggered by Korea. An economic avalanche was started in this area by that event. The Korean conflict was settled, after a fashion, but the avalanche that had been started here just kept rolling. Eastern concerns suddenly seemed to realize the tremendous market that had been built up in the West. They realized that this was a market that they could not afford to pass up. It was just too big to be ignored any longer. And how were they to tap it? Freight rates were too high. Their existing facilities were too far away. So the only way to tap this market was with a branch plant or branch warehouse. Companies by the hundreds made this decision, and so we had the industrial growth. A lot of it was in aircraft, but far less than most people seem to think. Our growth was in practically every industrial category representing a wide variety of concerns from the East trying to tap this burgeoning Western market. As new plants came in, they brought new people; and as new people came in, they increased the size of the market, which made it more attractive for more industry.

We had this chain reaction type of growth until about a year ago, when this recession trimmed us back a little bit. We are not under the impression that when the recession is over, we are going to resume the 1950-57 pace. I do not believe we are going to grow at quite the rate we have seen. The aircraft industry provided a lot of the past impetus. It is not going to provide nearly as much in the future. Where aircraft is leaving off, we do think that there are other industries of a wide range to take up much of the slack. This area has a big stake in research and development—electronics in particular. This is one of the leading areas, and some insist that this is *the* leading area, in the United States in electronic research and development. We are at the very heart of this major growth industry, and there are already indications that it has turned the corner of this recession and is beginning to expand again. It did not decline very much—not nearly as much as the aircraft industry—and apparently the turn has been made and that industry is beginning to move up again. My personal belief is that the electronics industry will continue to expand, both in the months ahead and for many years to come. I feel that in time the electronics industry will become the largest industry in the Los Angeles area, larger than aircraft.

The Los Angeles area—and the West in general—will continue to grow, and at a very substantial rate. Our growth may be a little less buoyant than in much of the 1950-57 period, but it will be strong. Percentagewise, it should be fully double the national rate of growth in the years ahead. In conclusion, I hope you do not feel I have had you going past that coffin at 22 miles an hour.

STOCK MARKET LUNCHEON

The New Speculation in Common Stocks

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ASKED HARTLEY SMITH, in introducing me to you, to lay chief stress upon my advanced age. What I shall have to say will reflect the spending of many years in Wall Street, with their attendant varieties of experience. This has included the recurrent advent of new conditions, or a new atmosphere, which challenge the value of experience itself. It is true that one of the elements that distinguish economics, finance, and security analysis from other practical disciplines is the uncertain validity of past phenomena as a guide to the present and future. Yet we have no right to reject the lessons of the past until we have at least studied and understood them. My address today is an effort toward such understanding in a limited field—in particular, an endeavor to point out some contrasting relationships between the present and the past in our underlying attitudes towards investment and speculation in common stocks.

Let me start with a summary of my thesis. In the past the speculative elements of a common stock resided almost exclusively in the company itself; they were due to uncertainties, or fluctuating elements, or downright weaknesses in the industry, or the corporation's individual set-up. These elements of speculation still exist, of course; but it may be said that they have been sensibly diminished by a number of long-term developments to which I shall refer. But in revenge a new and major element of speculation has been introduced into the common-stock arena from *outside* the companies. It comes from the attitude and viewpoint of the stock-buying public and their advisers—chiefly us security analysts. This attitude may be described in a phrase: primary emphasis upon future expectations.

Nothing will appear more logical and natural to this audience than the idea that a common stock should be valued and priced primarily on the basis of the company's expected future performance. Yet this simple-appearing concept carries with it a number of paradoxes and pitfalls. For one thing, it obliterates a good part of the older, well-established distinctions between investment and speculation. The dictionary says that "speculate" comes from the Latin "specula", a look-out or watch-tower. Thus it was the speculator who looked out from his elevated watch-tower and saw future developments coming before other people did. But today, if the investor is shrewd or well-advised, he too must have his watch-tower looking out on the future, or

rather he mounts into a common watch-tower where he rubs elbows with the speculator.

Secondly, we find that, for the most part, companies with the best investment characteristics—i.e., the best credit rating—are the ones which are likely to attract the largest speculative interest in their common stocks, since everyone assumes they are guaranteed a brilliant future. Thirdly, the concept of future prospects, and particularly of continued growth in the future, invites the application of formulae out of higher mathematics to establish the present value of the favored issues. But the combination of precise formulae with highly imprecise assumptions can be used to establish, or rather to justify, practically any value one wishes, however high, for a really outstanding issue. But, paradoxically, that very fact on close examination will be seen to imply that no one value, or reasonably narrow range of values, can be counted on to establish and maintain itself for a given growth company; hence at times the market may conceivably value the growth component at a strikingly *low* figure.

Returning to my distinction between the older and newer speculative elements in common stock, we might characterize them by two outlandish but convenient words, viz: endogenous and exogenous. Let me illustrate briefly the old-time speculative common stock, as distinguished from an investment stock, by some data relating to American Can and Pennsylvania Railroad in 1911-13. (These appear in "Security Analysis", 1940 Edition, pp. 2-3.)

In those three years the price range of "Pennsy" moved only between 53 and 65, or between 12.2 and 15 times its average earnings for the period. It showed steady profits, was paying a reliable \$3 dividend, and investors were sure that it was backed by well over its par of \$50 in tangible assets. By contrast, the price of American Can ranged between 9 and 47; its earnings between 7c and \$8.86; the ratio of price to the average earnings moved between 1.9 times and 10 times; it paid no dividend at all; and sophisticated investors were well aware that the \$100 par value of the common represented nothing but undisclosed "water", since the preferred issue exceeded the tangible assets available for it. Thus American Can common was a representative speculative issue, because American Can Company was then a speculative-capitalized enterprise in a fluctuating and uncertain industry. Actually, American Can had a far more

brilliant long-term future than Pennsylvania Railroad; but not only was this fact not suspected by investors or speculators in those days, but even if it had been it would probably have been put aside by the investors as basically irrelevant to investment policies and programs in the years 1911-1913.

Now, to expose you to the development through time of the importance of long-term prospects for investments, I should like to use as my example our most spectacular giant industrial enterprise—none other than International Business Machines, which last year entered the small group of companies with \$1 billion of sales. May I introduce one or two autobiographical notes here, in order to inject a little of the personal touch into what otherwise would be an excursion into cold figures? In 1912 I had left college for a term to take charge of a research project for U. S. Express Co. We set out to find the effect on revenues of a proposed revolutionary new system of computing express rates. For this purpose we used the so-called Hollerith machines, leased out by the then Computing-Tabulating-Recording Co. They comprised card-punches, card-sorters, and tabulators—tools almost unknown to businessmen, then, and having their chief application in the Census Bureau. I entered Wall Street in 1914, and the next year the bonds and common stock of C.-T.-R. Co. were listed on the New York Stock Exchange. Well, I had a kind of sentimental interest in that enterprise, and besides I considered myself a sort of technological expert on their products, being one of the few financial people who had seen and used them. So early in 1916 I went to the head of my firm, known as Mr. A. N., and pointed out to him that C.-T.-R. stock was selling in the middle 40s (for 105,000 shares); that it had earned \$6.50 in 1915; that its book value—including, to be sure, some non-segregated intangibles—was \$130; that it had started a \$3 dividend; and that I thought rather highly of the company's products and prospects. Mr. A. N. looked at me pityingly. "Ben," said he, "Do not mention that company to me again. I would not touch it with a ten-foot pole. (His favorite expression.) Its 6% bonds are selling in the low 80s and they are no good. So how can the stock be any good. Everybody knows there is nothing behind it but water." (Glossary: In those days that was the ultimate of condemnation. It meant that the asset-account on the balance sheet was fictitious. Many industrial companies—notably U. S. Steel—despite their \$100 par, represented nothing but water, concealed in a written-up plant account. Since they had "nothing" to back them but earning power and future prospects, no self-respecting investor would give them a second thought.)

I returned to my statistician's cubby-hole, a chastened young man. Mr. A. N. was not only experienced and successful, but extremely shrewd as well. So much was I impressed by his sweeping condemnation of Computing-Tabulating-Recording that I never bought a share of it in my life, not even after its name was changed to IBM in 1926.

Now let us take a look at the same company with its new name in 1926, a year of pretty high stock markets. At that time it first revealed the good-will item in its balance-sheet, in the rather large sum of \$13.6 millions. A. N. had been right. Practically every dollar of the so-called equity

behind the common in 1915 had been nothing but water. However, since that time the company had made an impressive record under the direction of T. L. Watson, Sr. Its net had risen from \$691,000 to \$3.7 million—over five-fold—a greater percentage gain than it was to make in any subsequent 11-year period. It had built up a nice tangible equity for the common, and had split it 3.6 for one. It had established a \$3 dividend rate for the new stock, while earnings were \$6.39 thereon. You might have expected the 1926 stock market to have been pretty enthusiastic about a company with such a growth history and so strong a trade position. Let us see. The price range for that year was 31 low, 59 high. At the average of 45 it was selling at the same 7-times multiplier of earnings and the same 6.7% dividend yield as it had done in 1915. At its low of 31 it was not far in excess of its tangible book value, and in that respect was far more conservatively priced than 11 years earlier.

These data illustrate, as well as any can, the persistence of the old-time investment viewpoint until the culminating years of the bull market of the 1920s. What has happened since then can be summarized by using 10-year intervals in the history of IBM. In 1936 net expanded to twice the 1926 figures, and the average multiplier rose from 7 to 17½. From 1936 to 1946 the gain was 2½ times, but the average multiplier in 1946 remained at 17½. Then the pace accelerated. The 1956 net was nearly 4 times that of 1946, and the average multiplier rose to 32½. Last year, with a further gain in net, the multiplier rose again to an average of 42, if we do not count the unconsolidated equity in the foreign subsidiary.

When we examine these recent price figures with care we see some interesting analogies and contrasts with those of 40 years earlier. The one-time scandalous water, so prevalent in the balance-sheets of industrial companies, has all been squeezed out—first by disclosure and then by write-offs. But a different kind of water has been put back into the valuation by the stock market—by investors and speculators themselves. When IBM now sells at 7-times its book value, instead of 7-times earnings, the effect is practically the same as if it had no book value at all. Or the small book-value portion can be considered as a sort of minor preferred-stock component of the price, the rest representing exactly the same sort of commitment as the old-time speculator made when he bought Woolworth or U. S. Steel common entirely for their earning power and future prospects.

It is worth remarking, in passing, that in the 30 years which saw IBM transformed from a 7-times earnings to a 40-times earnings enterprise, many of what I have called the endogenous speculative aspects of our large industrial companies have tended to disappear, or at least to diminish greatly. Their financial positions are firm, their capital structures conservative; they are managed far more expertly, and even more honestly, than before. Furthermore, the requirements of complete disclosure have removed one of the important speculative elements of years ago—that derived from ignorance and mystery.

Another personal digression here. In my early years in the Street one of the favorite mystery stocks was Consoli-

dated Gas of New York, now Consolidated Edison. It owned as a subsidiary the profitable New York Edison Co., but it reported only dividends received from this source, not its full earnings. The unreported Edison earnings supplied the mystery and the "hidden value." To my surprise I discovered that these hush-hush figures were actually on file each year with the Public Service Commission of the state. It was a simple matter to consult the records and to present the true earnings of Consolidated Gas in a magazine article. (Incidentally, the addition to profits was not spectacular.) One of my older friends said to me then: "Ben, you may think you are a great guy to supply those missing figures, but Wall Street is going to thank you for nothing. Consolidated Gas with the mystery is both more interesting and more valuable than ex-mystery. You youngsters who want to stick your noses into everything are going to ruin Wall Street."

It is true that the three M's which then supplied so much fuel to the speculative fires have now all but disappeared. These were Mystery, Manipulation, and (thin) Margins. But we security analysts have ourselves been creating valuation approaches which are so speculative in themselves as to pretty well take the place of those older speculative factors. Do we not have our own "3 M's" now—none other than Minnesota Mining and Manufacturing Co.—and does not this common stock illustrate perfectly the new speculation as contrasted with the old? Consider a few figures. When M.M. & M. common sold at 101 last year the market was valuing it at 44 times 1956 earnings, which happened to show no increase to speak of in 1957. The enterprise itself was valued at \$1.7 billion, of which \$200 million was covered by net assets, and a cool \$1½ billion represented the market's appraisal of "good-will". We do not know the process of calculation by which that valuation of good-will was arrived at; we do know that a few months later the market revised this appraisal downward by some \$450 million, or about 30%. Obviously it is impossible to calculate accurately the intangible component of a splendid company such as this. It follows as a kind of mathematical law that the more important the good-will or future earning-power factor the more uncertain becomes the true value of the enterprise, and therefore the more speculative inherently the common stock.

It may be well to recognize a vital difference that has developed in the valuation of these intangible factors, when we compare earlier times with today. A generation or more ago it was the standard rule, recognized both in average stock prices and in formal or legal valuations, that intangibles were to be appraised on a more conservative basis than tangibles. A good industrial company might be required to earn between 6% and 8% on its tangible assets, represented typically by bonds and preferred stock; but its excess earnings, or the intangible assets they gave rise to, would be valued on, say, a 15% basis. (You will find approximately these ratios in the initial offering of Woolworth Preferred and Common stock in 1911, and in numerous others.) But what has happened since the 1920s? Essentially the exact reverse of these relationships may now be seen. A company must now typically earn about 10% on its common equity to have it sell in the average market at full book value. But

its excess earnings, above 10% on capital, are usually valued more liberally, or at a higher multiplier, than the base earnings required to support the book value in the market. Thus a company earning 15% on the equity may well sell at 13½ times earnings, or twice its net assets. This would mean that the first 10% earned on capital is valued at only 10 times, but the next 5%—what used to be called the excess—is actually valued at 20 times.

Now there is a logical reason for this reversal in valuation procedure, which is related to the newer emphasis on growth expectations. Companies that earn a high return on capital are given these liberal appraisals not only because of the good profitability itself, and the relative stability associated with it, but perhaps even more cogently because high earnings on capital generally go hand and hand with a good growth record and prospects. Thus what is really paying for nowadays in the case of highly profitable companies is not the good-will in the old and restricted sense of an established name and a profitable business, but rather for their assumed superior expectations of increased profits in the future.

This brings me to one or two additional mathematical aspects of the newer attitude toward common-stock valuations, which I shall touch on merely in the form of brief suggestions. If, as many tests show, the earnings multiplier tends to increase with profitability—i.e., as the rate of return on book value increases—then the arithmetical consequence of this feature is that value tends to increase directly as the square of the earnings, but *inversely* with book value. Thus in an important and very real sense tangible assets have become a drag on average market value rather than a source thereof. Take a far from extreme illustration. If Company A earns \$4 a share on a \$20 book value, and Company B also \$4 a share on \$100 of book value, Company A is almost certain to sell at a higher multiplier, and hence at higher price than Company B—say \$60 for Company A shares and \$35 for Company B shares. Thus it would not be inexact to declare that the \$80 per share of greater assets for Company B are responsible for the \$25 per share lower market price, since the earnings per share are assumed to be equal.

But more important than the foregoing is the general relationship between mathematics and the newer approach to stock values. Given the three ingredients of (a) optimistic assumptions as to the rate of earnings growth, (b) a sufficiently long projection of this growth into the future, and (c) the miraculous workings of compound interest—and the security analyst is supplied with a new kind of Philosopher's Stone which can produce or justify any desired valuation for a really "good stock." I have commented in a recent article in the *Analysts Journal* on the vogue of higher mathematics in bull markets, and quoted David Durand's exposition of the striking analogy between value calculations of growth stocks and the famous Petersburg Paradox, which has challenged and confused mathematicians for more than 200 years. The point I want to make here is that there is a special paradox in the relationship between mathematics and investment attitudes on common stocks, which is this: Mathematics is ordinarily considered as producing precise and dependable results; but in the stock market the

more elaborate and abstruse the mathematics the more uncertain and speculative are the conclusions we draw therefrom. In 44 years of Wall Street experience and study I have never seen dependable calculations made about common-stock values, or related investment policies, that went beyond simple arithmetic or the most elementary algebra. Whenever excalculus is brought in, or higher algebra, you could take it as a warning signal that the operator was trying to substitute theory for experience, and usually also to give to speculation the deceptive guise of investment.

The older ideas of common-stock investment may seem quite naive to the sophisticated security analyst of today. The great emphasis was always on what we now call the defensive aspects of the company or issue—mainly the assurance that it would continue its dividend unreduced in bad times. Thus the strong railroads, which constituted the standard investment commons of 50 years ago, were actually regarded in very much the same way as the public-utility commons in recent years. If the past record indicated stability, the chief requirement was met; not too much effort was made to anticipate adverse changes of an underlying character in the future. But, conversely, especially favorable future prospects were regarded by shrewd investors as something to look for but not to pay for.

In effect this meant that the investor did not have to pay anything substantial for superior long-term prospects. He got these, virtually without extra cost, as a reward for his own superior intelligence and judgment in picking the best rather than the merely good companies. For common stocks with the same financial strength, past earnings record, and dividend stability, all sold at about the same dividend yield.

This was indeed a short-sighted point of view, but it had the great advantage of making common-stock investment in the old days not only simple but also basically sound and highly profitable. Let me return for the last time to a personal note. Somewhere around 1920 our firm distributed a series of little pamphlets entitled "Lessons for Investors". Of course it took a brash analyst in his middle twenties like myself to hit on so smug and presumptuous a title. But in one of the papers I made the casual statement that "If a common stock is a good investment it is also a good speculation." For, reasoned I, if a common stock was so sound that it carried very little risk of loss it must ordinarily be so good as to possess excellent chances for future gains. Now this was a perfectly true and even valuable discovery, but it was true only because nobody paid any attention to it. Some years later, when the public woke up to the historical merits of common stocks as long-term investments, they soon ceased to have any such merit, because the public's enthusiasm created price levels which deprived them of their built-in margin of safety, and thus drove them out of the investment class. Then, of course, the pendulum swung to the other extreme, and we soon saw one of the most respected authorities declaring (in 1931) that no common stock could *ever* be an investment.

When we view this long-range experience in perspective we find another set of paradoxes in the investor's changing attitude towards capital gains as contrasted with income. It

seems a truism to say that the old-time common-stock investor was not much interested in capital gains. He bought almost entirely for safety and income, and let the speculator concern himself with price appreciation. Today we are likely to say that the more experienced and shrewd the investor, the less attention he pays to dividend returns, and the more heavily his interest centers on long-term appreciation. Yet one might argue, perversely, that precisely because the old-time investor did not concentrate on future capital appreciation he was virtually guaranteeing to himself that he would have it, at least in the field of industrial stocks. And, conversely, today's investor is so concerned with anticipating the future that he is already paying handsomely for it in advance. Thus what he has projected with so much study and care may actually happen and still not bring him any profit. If it should fail to materialize to the degree expected he may in fact be faced with a serious temporary and perhaps even permanent loss.

What *lessons*—again using the pretentious title of my 1920 pamphlets—can the analyst of 1958 learn from this linking of past with current attitudes? Not much of value, one is inclined to say. We can look back nostalgically to the good old days when we paid only for the present and could get the future for nothing—an "all this and Heaven too" combination. Shaking our heads sadly we mutter, "Those days are gone forever". Have not investors and security analysts eaten of the tree of knowledge of good and evil prospects? By so doing have they not permanently expelled themselves from that Eden where promising common stocks at reasonable prices could be plucked off the bushes? Are we not doomed always to run the risk either of paying unreasonably high prices for good quality and prospects, or of getting poor quality and prospects when we pay what seems a reasonable price?

It certainly looks that way. Yet one cannot be sure even of that pessimistic dilemma. Recently, I did a little research in the long-term history of that towering enterprise, General Electric—stimulated by the arresting chart of 59 years of earnings and dividends appearing in their recently published 1957 Report. These figures are not without their surprises for the knowledgeable analyst. For one thing they show that prior to 1947 the growth of G.E. was fairly modest and quite irregular. The 1946 earnings, per share adjusted, were only 30% higher than in 1902—52c vs. 40c—and in no year of this period were the 1902 earnings as much as doubled. Yet the price-earnings ratio rose from 9 times in 1910 and 1916 to 29 times in 1936 and again in 1946. One might say, of course, that the 1946 multiplier at least showed the well known prescience of shrewd investors. We analysts were able to foresee then the really brilliant period of growth that was looming ahead in the next decade. Maybe so. But some of you remember that the next year, 1947, which established an impressive new high for G.E.'s per share earnings, was marked also by an extraordinary fall in the price-earnings ratio. At its low of 32 (before the 3-for-1 split) G.E. actually sold again at only 9 times its current earnings, and its average price for the year was only about 10 times earnings. Our crystall ball certainly clouded over in the short space of twelve months.

This striking reversal took place only eleven years ago. It casts some little doubt in my mind as to the complete dependability of the popular belief among analysts that prominent and promising companies will now always sell at high price-earnings ratios; that this is a fundamental fact of life for investors and they may as well accept and like it. I have no desire at all to be dogmatic on this point. All I can say is that it is not settled in my mind, and each of you must seek to settle it for yourself.

But in my concluding remarks I can say something definite about the structure of the market for various types of common stocks, in terms of their investment and speculative characteristics. In the old days the investment character of a common stock was more or less the same as, or proportionate with, that of the enterprise itself, as measured quite well by its credit rating. The lower the yield on its bonds or preferred, the more likely was the common to meet all the criteria for a satisfactory investment, and the smaller the element of speculation involved in its purchase. This relationship, between the speculative ranking of the common and the investment rating of the company, could be graphically expressed pretty much as a straight line descending from left to right. But nowadays I would describe the graph as U-shaped. At the left, where the company itself is speculative and its credit low, the common stock is of course highly speculative, just as it has always been in the past. At the right extremity, however, where the company has the highest credit rating because both its past record and future prospects are most impressive, we find that the stock market tends more or less continuously to introduce a highly speculative element into the common shares through the simple means of a price so high as to carry a fair degree of risk.

At this point I cannot forbear introducing a surprisingly relevant, if quite exaggerated, quotation on the subject

which I found recently in one of Shakespeare's sonnets. It reads:

"Have I not seen dwellers on form and favor
Lose all and more by paying too much rent?"

Returning to my imaginary graph, it would be the center area where the speculative element in common-stock purchases would tend to reach its minimum. In this area we could find many well-established and strong companies, with a record of past growth corresponding to that of the national economy and with future prospects apparently of the same character. Such common stocks could be bought at most times, except in the upper ranges of a bull market, at moderate prices in relation to their indicated intrinsic values. As a matter of fact, because of the present tendency of investors and speculators alike to concentrate on more glamorous issues, I should hazard the statements that these middle-ground stocks tend to sell on the whole rather below their independently determinable values. They thus have a margin-of-safety factor supplied by the same market preferences and prejudices which tend to destroy the margin of safety in the more promising issues. Furthermore, in this wide array of companies there is plenty of room for penetrating analysis of the past record and for discriminating choice in the area of future prospects, to which can be added the higher assurance of safety conferred by diversification.

When Phaethon insisted on driving the chariot of the Sun, his father, the experienced operator, gave the neophyte some advice which the latter failed to follow—to his cost. Ovid summed up Phoebus Apollo's counsel in three words:

"Medius tutissimus ibis"

"You will go safest in the middle course"

I think this principle holds good for investors and their security-analyst advisers.



AIRCRAFT RADIO CORPORATION

Boonton, New Jersey

Dividend No. 101

On June 17, 1958, the Directors of Aircraft Radio Corporation declared a dividend of twenty cents (20c) per share on the common stock of the Company, payable July 8, 1958, to stockholders of record at the close of business June 25, 1958.

HERBERT M. KINGSLAND
Assistant Secretary

FEDERAL

FEDERAL PAPER BOARD CO., Inc.

Common & Preferred Dividends

The Board of Directors of Federal Paper Board Company, Inc., has this day voted the regularly quarterly dividend of 50 cents a share on the common stock, payable July 15, 1958 to holders of record July 2, 1958.

In place of the usual dividend of 28¾ cents a share on the 4.6% Cumulative \$25 par value Preferred Stock, the Board declared two separate dividends, both payable September 15, 1958. Holders of record June 27, 1958 will receive 4¾ cents a share and holders of record August 29, 1958 will receive 24 cents a share. The split dividend was declared to provide for the new preferred stockholders expected to result from the merger with Federal Glass Company now pending.

ROBERT A. WALLACE
Vice President and Secretary

May 23, 1958
Bogota, New Jersey



THE FLINTKOTE COMPANY

New York 20, N. Y.

QUARTERLY DIVIDENDS have been declared as follows:

Common Stock*

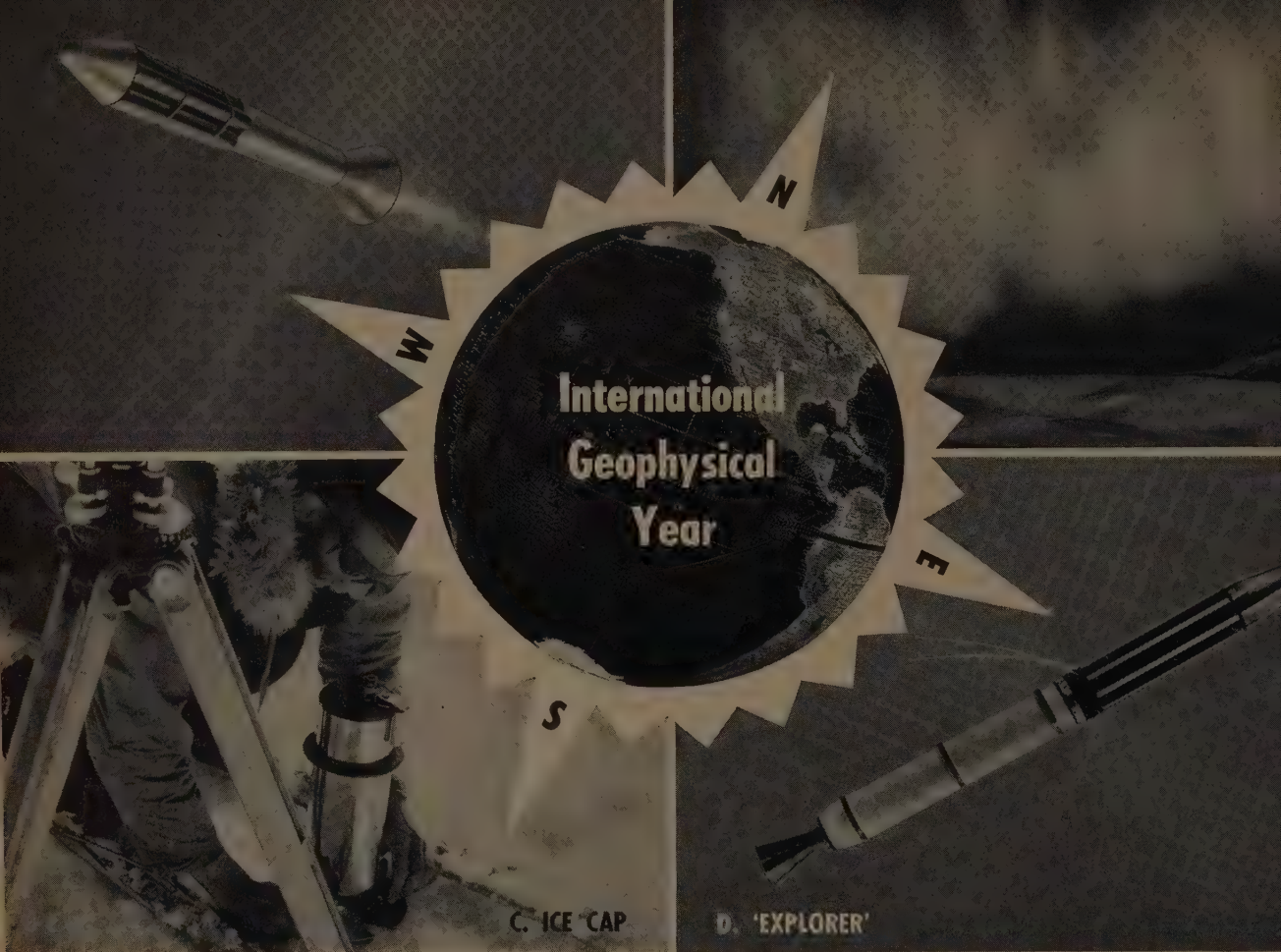
sixty cents (\$.60) per share
\$4 Cumulative Preferred Stock
one dollar (\$1) per share

Both dividends are payable June 16, 1958 to stockholders of record at the close of business May 22, 1958.

WILLIAM FEICK, JR.
Vice-President and Treasurer

May 7, 1958.

*119th consecutive dividend



exploring for a better world

AT THE FOUR CORNERS OF THE EARTH, more than 5000 scientists from 67 countries are joined in an all-out assault on the vast gaps in our knowledge of the universe. In, on and above the earth, studies are underway to learn more about how we can make better use of the planet we call home.

- A. ENIWETOK, South Pacific** — Four dozen tiny Texas Instruments components (diodes and transistors) rode more than 4000 miles out into space in Operation Farside, current holder of rocket altitude record.
- B. NORTH POLE, Arctic** — *recti/riters*, TI ink-writing rectilinear recorders, trace the flicker of the aurora borealis and measure the all-but-invisible polar airglow.

- C. SOUTH POLE, Antarctic** — Texas Instruments seismic exploration systems plumb the depths of the polar ice cap... TI's famed *Worden* gravity meters weigh the earth beneath... *recti/riters* warn scientific adventurers against deadly ice crevasses.
- D. CAPE CANAVERAL, Florida** — TI transistors and diodes in the Jupiter-C missile helped put the Explorer on its journey... and the United States' first satellite uses Texas Instruments transistors.

Texas Instruments role in these great scientific events results naturally from TI's more than a quarter-century experience in geophysical exploration... and in the design, development and manufacture of geophysical instrumentation, electromechanical systems and electronic components for rugged commercial and military applications.

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ELECTRONICS—SYSTEMS AND INSTRUMENTS

Management of Research and Development Programs

DAVID PACKARD

President, Hewlett-Packard Company

IN THE LAST FEW YEARS the subject of Research and Development has received increasing attention from people engaged in security analysis. Sometimes it seems as though more significance is placed on the number of dollars spent on Research and Development than in the number of dollars which show up as profits in company statements. There is some reason for this attitude because experience does show a reasonably good correlation between the amount of money spent on research and development and company growth, particularly in certain industries. The companies engaged in fields of chemicals, drugs, electrical machinery and electronics, among others, have spent a relatively large proportion of their sales dollar on research and development and the growth in these fields has been larger than that of many other industries. Likewise, we can point out that research and development by the railroad companies has been rather small and whether or not this bears on their problem I will leave to your judgment.

Research is searching for new ideas. We may have scientific research, which is what we usually think of when we hear the term, but research in marketing and in other company operations is often equally important. I like to think of research more as a state of mind, an attitude, more than a specific program. I think we must continually remind ourselves, however, that research is done to assure continuing and growing profits. It is not done just for the sake of growth or diversification or some of the other reasons we commonly hear.

Research and development has played a tremendous part in the rapid expansion of the electronic industry during and since World War II. We often think of research as primarily directed at uncovering new and fundamental laws of nature. Actually, most research done by industry is applied research, the application of already known principles to new products. In the field of electronics, with the exception of the work done in solid state theory, and in a few other areas, most of the things we are doing today could have been done twenty years ago. For example, the basic scientific laws on which radar is based were developed back in the 1880's by James Clerk Maxwell. This is not unlike the situation in the field of atomic energy wherein Einstein's mathematical work demonstrated that tremendous energies are available from atomic mutation at the turn of the century, yet it was only with the tremendous research effort, supported by the Government during the war, that

this phenomenon was finally reduced to practical use.

We are now talking about a great many interesting industrial applications of electronics. Almost all of these things we could have done before World War II but they were just not economically feasible. The tremendous amount of research and development effort required to reduce the ideas to practical form could not be justified in relation to the commercial market. This, of course, changed completely during the war; money was no object, and vast effort was directed in the field of electronics to do the things that were required to win the war. This set the base on which the electronic industry has expanded in the last decade. Without this Government-supported research and development, many of the commercial possibilities would still be far in the future.

I think, then, it would be well to talk a little more about the kind of research that is done by industry. A few larger industries can support a reasonable amount of what we might call pure research, but few small companies can afford to do so. In true research the worker is looking for fundamentally new ideas and he must follow where his search will lead him. If then his search leads him far afield from the basic area in which his company is engaged, his work may be of little practical value to the company. If the company is large and covers many areas, then there is a good chance that it may be able to take advantage of basic research wherever it leads. Most companies must have a research program carefully directed to their field of interest.

And there is not much uniformity in accounting for research on the profit and loss statement. Most of the work is, and should be, new product development. Sometimes routine engineering is included. Often, however, market research and other research which the company may be doing outside the technical field is not included. I think, however, there are some other considerations which may help you in evaluating the research and development program of a company in addition to the percentage of sales dollar which is spent.

I think it is important for the research and development expenditure to be compared with the profits of a company because if the company has been unable to convert its research and development expenditures into profit in a reasonably short time, it indicates an important failure of management. In our case we think it is important that the

relation between research and development be kept so that the research and development expenditure is not more than about 50% of profits before taxes. Of course, we like to maintain this ratio by keeping profits up rather than research and development down.

In order to understand why this is important, I would like to take a minute to explore with you the economic history of a typical new product. When a new product is first brought out, assuming of course that it has a large element of novelty, it is during the early years of its life that it has the most value to the customer and can produce the largest profit to the manufacturer. After the product has been on the market a few years, either competition or obsolescence will tend to force the product into narrow profit margins and it is difficult to achieve a reasonable return. TV provides a good example of this phenomenon. In the first few years after TV was introduced those in the field were able to operate with fairly satisfactory profit margins. In the last few years the squeeze has begun, many firms are dropping out of the field, and only the most efficient, low-cost producer, who is satisfied with a small margin, can survive. The history of penicillin provides a similar example in the drug business. Whether this is the result of basic economic law or human nature we sometimes wonder when we look at the automobile business and realize that the companies seem to make the best profit only in the years when they bring out a really new model.

In addition to the amount spent on research and development, then, it is particularly important to determine whether this expenditure has been efficiently converted to profit in past and present operations.

The second check which should be made is to determine whether, in a company with a large research and development expenditure, the growth has been from new products resulting from research and development. Sometimes the research and development expenditure is large, but the growth mainly from acquisition and merger.

There are two basically different approaches to research and development in the field of instruments and systems. Some people sell their research and development work either to the Government or to industry. Some people support their own research and development and sell the resulting products. These are the two extremes. There are, of course, many degrees between. Those people who sell their research and development efforts are usually involved in Government work and are able to realize a profit seldom as much as 10% on the research dollar expended. In our case we are using our research and development effort to generate new proprietary products and historically we have been able to obtain about \$5 in profit for each dollar expended in research and development.

Whichever the approach, it is important to remember that research and development must be a total company concept and cannot be just allocated to a department and left to run free. This is obvious because the nature of the company is determined by the nature of its product, whether it be a salable item or whether the product be research and development. I think it might be interesting if I describe in a little more detail our basic approach to the management of research and development.

First, we must search for ideas on which our new product efforts are to be expended, and these ideas have two dimensions—a technical dimension and a marketing dimension. All good new product work must be closely controlled as to its technical feasibility and its market potential. And where do these ideas come from? One source is, of course, the company research effort itself, especially if, as is usually the case, some portion, whether large or small, is directed toward basic research. The research carried on by the great universities throughout the country is an unusually good source of ideas in the electronics field. You will note that Pasadena, Palo Alto, and Boston, among others, are centers of activity in the instrument systems field. This is because of the important research effort carried on in electronics at California Institute of Technology, Stanford University and Massachusetts Institute of Technology, respectively. The literature in the field is of course an important source of new ideas and special efforts are called for to keep up with the material which is published from all available sources. Although this country has a great lead in electronic work, many ideas are available from foreign countries and most of us in this business try and keep close touch with what is going on in Europe and other industrial areas throughout the world. All of us receive many ideas from inventors who write in and although the batting average is not high, we occasionally receive a good idea from this source. And, finally, our customers are a good, in fact, a most important, source of new ideas, for we are in business to develop instruments to meet their requirements.

Most of us have available through these various sources more ideas for new product development than we can use, and so it becomes necessary to carefully evaluate each idea and select only those with the greatest potential. We first like to be sure that the idea has a broad market potential. Second, that it fits in with our own marketing ability. Third, that it is technically feasible, and, finally, we like to be sure that the new idea has a large measure of novelty. As I put it to our management people, a new product is most valuable when it makes an important contribution to our field of technology.

If the collection of ideas and the evaluation of them have been well done, then the chances of a good new product are high and the activation of a specific development program can be done with considerable assurance of success. The detail management of this phase is not important except for one thing, it is necessary to achieve and maintain a high level of enthusiasm among your technical people. After all, these people are undertaking to do things which have not been done before. They must have tremendous optimism and great enthusiasm or they will not accomplish their purpose. We place a good deal of emphasis in trying to provide the right atmosphere for our technical people and to make sure they receive the recognition which their accomplishments justify. This is, of course, a fundamental problem of management in all industry, how to give adequate recognition to the technical man without promoting him into administrative work, where he may be both inefficient and unhappy.

The field of Instruments and Systems is an important part of the electronic industry. Its continued progress is

highly dependent upon research and development. Those of us who are engaged in the field are pleased with the progress which has been made but we feel there is much more yet to do. Electronic instruments replace or expand the human senses. These instruments make it possible for

us to know a great deal more about the physical environment. Systems in a very real sense expand the human intellect. They increase our ability to calculate, to remember, and in many areas they may provide, if not judgment itself, at least a better basis for judgment.

The Nature of Industrial Instrumentation — Its Application and Marketing

R. T. SILBERMAN

President, Kin Tel Division, Cobu Electronics, Inc.

IN FACE OF continued heavy expenditures for missiles, rockets, and space, it is difficult to imagine circumstances in the next five to ten years that will allow for significant decreases in our taxation, even to stabilize our national debt. Realizing that the percent of gross income applied to wages has more than doubled in the last 20 years, and that for the next five to ten years there is little hope for tax relief, one can envision a continuing pressure on corporate profits and dividends. This consideration is important to electronic instrumentation manufacturers because the effect of increased wages has been compounded by virtue of the fact that industrial productivity has not kept pace. The fact that industrial productivity is out of line with wages means that the cost of government, the cost of processed raw materials, and the cost of major ingredients in our industrial economic formula has also gone up.

Electronic instrumentation is a positive and available aid to productivity. The electronic industry itself must, even in the face of demanding government projects, more seriously pursue industrial applications. Conceivably, the investors in electronic instrument corporations could receive much greater profits from repeat industrial sales.

THE PRODUCT

Measurement is the key to man's scientific and industrial progress. Electronic instrumentation affords the most precise form of measurement. Once a physical phenomenon has been measured man can readily interpret it, control it, or apply it to other processes. The application of electronic measure techniques to military and industrial problems has been and will continue to expand literally without limit. Generally electronic techniques provide the optimum in simplicity, accuracy, and speed. These techniques have the capacity to handle tremendous amounts of data at great speed.

As commercial applications for electronic instrumentation are broadened, reliability will increase and cost decrease. Electronic instrumentation in the sense discussed here, of course, excludes so-called entertainment uses of electronic devices.

Electronics has spearheaded the development of auto-

matic and semi-automatic control systems for they are the backbone of increased accuracy, speed, and economy.

THE LANGUAGE

In any new industry there is always a certain amount of word stretching and term turning. It is important, I feel, to briefly define the terminology involved, since many words and definitions have been used interchangeably. Electronic instruments are generally defined as an end product which will perform measurement or complete functions, such as supplying DC or AC voltages, converting analog signals to digital signals, etc. Electronic instruments are frequently used as parts of measurement and control systems. Systems are combinations of electronic, electrical, mechanical, and pneumatic devices grouped to perform entire tasks automatically and continuously after pre-arranged instructions or upon the random commands of an operator. These systems, it should be remembered, are both large and small, simple and complex. When one looks even casually at the various building blocks or components of typical instrumentation systems he readily appreciates the reason why there are so many companies already in the field. There is broad opportunity and considerable ingenuity in providing the myriad of electronic, mechanical, and electrical devices required. A typical system might measure a physical phenomenon, such as temperature, pressure, or torque, record and analyze this data or even go one step further and, following analysis, control the physical factors that cause the phenomenon.

First is the transducer. This device converts the physical phenomenon to proportional electrical signals. Generally there is a transmission circuit which carries the signals from the transducer to the measurement circuits. The measurement circuits accurately and continuously measure the electric signal developed by the initial phenomenon. The recording circuit follows the measurement circuit and makes a recording of the measurements. The recording circuit may be followed by a decision circuit which would feed instructions automatically to the controlling device, which would in turn cause the physical factor creating the processes under measurement to be adjusted.

In typical large systems that Cohu Electronics has been involved with, several hundred measurements might be made simultaneously. In some of the smaller systems that we see a man might simply be interested in accurately measuring one temperature from a boiler and automatically controlling the power source. Electronic instrumentation has provided the means for all computer entry. The field of electronic computers has been well covered from engineering application and business facets. However, few realize that before one is ready to apply an industrial problem to a computer the problem must be expressed in terms that the computer understands.

Cohu Electronics builds simple electronic instruments that will, for example, collect a hundred temperatures for a missile test stand and automatically put them in a form that will permit computer analysis. This same operation if performed manually might take thousands of hours and, over a period of years, the relative cost would be several hundred thousand times the actual equipment investment.

The increased use of electronic entry or programming of computers has in itself been a major contribution to the advancement of the computer art. Automation, a word frequently misused, can simply be thought of as the integration of the systems and machines that I have mentioned with useful industrial processes and people.

At this point I believe it is important to clarify and expand on other facets of our fields of measurement. Recently, Cohu Electronics has placed on the market a series of very simple digital measuring instruments. It has been quite interesting to watch the reaction of potential customers when they realize that digital techniques can be applied to something very less complicated than a computer and acquired at a fraction of the cost—\$2000 to \$3000 a unit.

Most phenomena occur in nature in analog or continuous form. However, man has been accustomed to analyze processes in numerical or digital form. For example, the temperature within a room might vary up and down gradually and continuously throughout a day. One would like to know at various times throughout the day that the temperature was a particular value. With the new digital equipment it is possible to replace conventional meters, graphic recorders, and charts with low-cost reliable electronic instruments which will actually present a digital reading. For example, the hands on a clock point to numbers which must be interpreted in order to determine time. On some clocks that have been recently made available, time is actually stated as 3:00 which immediately can be read as 3 o'clock. In the same way these new digital instruments convert continuous process data such as temperature, pressure, and torque into direct values—352.2 degrees, 28.7 lb. per sq. in., 29.7 ft. lbs., etc. Not only are these digital devices easy to read but they provide greater accuracy and tend to eliminate human reading error and more important convert the analog representation of the phenomena to digital form. The digital or numerical value can then directly be printed on a tape which looks like an adding machine record or punched into cards for computer entry or recorded on magnetic tape for computer analysis.

Many have thought of industrial electronics as compris-

ing only big and complex operations and as a part of the complete automation of factories. Truly, the ambitions are technically feasible, but I feel in the next 10 years there will be a tremendous increase in the sale and installation of small, practical, easily understood and afforded systems such as the digital devices I have described. These devices can be considered merely as tools to supplement the worker and increase his productivity.

MARKETS

The markets for electronic instrumentation and the stimulus behind sales of this equipment are varied. The military, of course, have been the principal customer. Generally, as a customer, they have had the necessary money and the incentive to risk large amounts on the development of relatively new and exotic equipments. In the aircraft field electronic instrumentation has been used extensively in engine testing, wind tunnel evaluation, and the like. In missiles, electronic instrumentation plays an increasing role in the development of airframes, rocket and jet engines, and of course the all-important missile and aircraft guidance. Electronic instrumentation is being used more extensively by the military in the development of automatic checkout and testing equipment for all of their sophisticated weapons. Naturally, in the entire space program a little bit of every kind of electronic instrumentation is involved and must conform to more exacting specifications. Electronics has provided the key to automatic power through its precision for control. This, of course, applies to all forms of automatic activities. Military markets are today very competitive and will continue to be so. The present increased military expenditure has attracted new and intensified computers. The requirements in the military are always changing. On the plus side it is obvious that a bigger share of the total military budget will be spent for electronic instruments. Combined with this fact the cold war seems to offer at least 10 years of continued heavy activity in this field.

Industrial markets can be divided into two categories. We might consider first those systems which are in the \$100,000 plus category. For many years the chemical industry, for example, has used electrical supervisory control equipment. The petroleum and the utility industries have also used similar equipment. These industries, as well as the steel and oil industries, have recently moved toward the utilization of electronic instrumentation equipment. This equipment provides greater capacity, accuracy and speed in the centralized control of dispersed processes. While the large systems are literally groups of small systems combined in a single unit or order, in the industrial sale of these systems there are many factors which have caused the market to be quite competitive.

One of the major factors in making the sale of large systems today both costly and an essentially low profit business has been the fact that these systems are generally quite expensive. Naturally, when spending a large sum of money the customer is quite cautious and is interested in obtaining the broad opinions of many of the companies that feel they are capable of fulfilling his requirements. Since the customer generally does not have a specific technical back-

ground, many times it is difficult for him to evaluate the technical details or ramifications of the various proposals. Furthermore, when a customer is spending a large amount of money for an installation, he requires certain unique features. This means that a considerable amount of the engineering involved in the design or manufacture of a particular installation may not be pertinent to other installations.

Today the customer is obtaining a good value because the companies in the large system business are competing keenly for pioneer installations in various industries. One factor that is common to all systems, and especially pertinent in large systems, is the considerable amount of non-manufactured or resale items which the system installer must include in the sale. These items generally afford low resultant profit, which has led to a tendency among large system installers to manufacture more and more of the items involved themselves. This has been one factor in the acquisition by system companies of small specialty manufacturers, in order that they might have within their own corporate structure the various components and products necessary for complete system installation. One of the disadvantages of large systems is the fact that from six to eighteen months can often be used in the design and manufacture and consequently a significant amount of money is tied up in each sale. Over the long term, however, there will probably be but few companies remaining in the large industrial system market and the winners should share in a profitable and well-earned business.

Small systems generally fall in the price range of \$10,000 to \$30,000. In many instances these are system components or subsystems. They can be considered building blocks which a company may install to test a technique and, if satisfactory, subsequently expand. Small digital devices are having a considerable impact on the industrial instrumentation business. These devices provide faster reading and greater accuracy, and are tools which today can be used in a wide variety of manufacturing and process operations.

There are many basic measurements that are repeated throughout various industries. Consequently standard packages have been evolved, and more will be in the future, that can be used not only in one specialized application, but in a variety of applications. Frequently measured and controlled parameters are temperature, pressure, flow, thickness, finish, weight, torque, etc.

The electronic instrumentation industry is in a position to literally create cash registers for in-plant operations potentially as simple to operate, easy to understand, and as efficient and as profitable. These cash registers will not collect money directly off the assembly line, but will collect and control data relevant to production operations and processes, and just like the cash register, this information will be developed in numerical form. As previously mentioned, the numerical data can be used for direct entry into computers for statistical analysis. Thus as a plant's use of instrumentation expanded, the various small pockets of data collection and control could feed their summary data to a central computing center in the plant for accounting purposes to provide a simple second step in the expanded use of electronic instrumentation techniques.

To the manufacturer, small industrial systems provide increased opportunity for standard production runs of components and accessories, because as mentioned this equipment can be used in a wide variety of applications in different industries. Therefore, engineering can be re-used and amortized over larger numbers of installations. While the packages as viewed by a given customer might seem quite specialized, they in fact will have wide use. Small systems will be easier to sell, and fewer problems will be encountered with the customer's own procurement regulations. Jobs of the size mentioned can usually be purchased below corporate board level.

SELLING AND DISTRIBUTING TECHNIQUES

The sale of all forms of systems, large and small, requires specialized marketing methods. Electronic instrument manufacturers most often utilize one of two types of sales organizations or a combination of the two. The direct factory selling approach has the advantage that the manufacturer has 100% control and direction over the time of his sales personnel. Sales personnel can be moved from area to area and offices set up in those particular territories that offer maximum sales potential. Since the salesman spends all of his time on only the products of the manufacturer there is no problem with conflict of products between several manufacturers as is the case with sales representatives. If the volume is ample, costs generally are lower with factory sellings. The disadvantage of factory selling, say to factory sales organizations, is that in many instances the factory does not produce sufficient breadth of product or have a broad enough line to effectively utilize factory selling in all parts of the country.

There are very few instances where a manufacturer has been able to successfully use both direct factory sales and representatives on the same product. If, for example, a factory set up offices in those areas where he could support the office himself and tried to use representatives in other parts of the country, the representative would immediately feel that as soon as the volume was ample he would be relieved of his sales responsibility and the manufacturer would set up his own office. This tends to be a cap on incentive. The representative figures that the better job he does the sooner he will be replaced. Commission representatives, of course, have been used extensively by most small companies. Many companies today who are using their own factory sales branches initially used representatives. The commission sales representative is a member of the local community. The free enterprise incentive of the representative is significant. By his ability to handle several lines which are not in conflict he offers his customer a broader product coverage and many customers call the representative first on the "one call" theory that if he contacts a representative he can, from one source, find answers to the bulk of his requirements.

An important advantage of the representative is the fact that his fee is directly in proportion to his sales and that he maintains his own overhead. Consequently, as has been the case in the last six to nine months when there was a dip in business and manufacturers were interested in accelerating their sales activities, those manufacturers using repre-

sentatives did not have an increased sales burden on an already soft profit picture. In essence, the representative invests with the manufacturer in the development of new lines and customers. He asks for his return only after the development has been proven, that is, the sale has been consummated and the customer has paid for his equipment. Representatives tend to discipline manufacturers. Generally a man who is not directly on the payroll will fight harder for the customer when he feels he is right and this tends to act as a very good second check on quality and service.

For a representative type sales organization to be effective, strong continuous home office support is a prime necessity. A unique facet of the representative business is that it seems to lend itself ideally to the sale of small systems. Factory system sales techniques generally require the potential of a particular sale to be pretty large before the top man can be utilized to pursue it. The manufacturer using representatives can buy a fraction of the representative's time; in other words, if he needs a sales job on a particular system installation the man in the area may well be of high enough quality to handle a much larger job, but because he has other sources of income he will be willing to spend some portion of his time on a smaller job. Companies that generally have pursued large jobs find the exploitation of small systems quite expensive for their type of sales organization and are generally hesitant to use a man of the caliber of the representative to close a small sale.

MANUFACTURING OPERATIONS

While there are companies who have been successful in manufacturing both military and commercial products under the same roof, the problems involved in commercial manufacture are quite different from military. Specifically, an organization must equip itself with many red tape functions if it is to profitably pursue military business. In this instance we mean the manufacture of equipment to customers' special military requirements. In Kin Tel, while the military is a significant customer, to the extent of 60 to 70% of our total business, the military buys standard commercial products. These commercial products can be used in their same packages or wrappings for industrial and military applications. As the industrial market develops we will not be trying to sell the commercial customer a worked over military model or a model with features not pertinent to the industrial requirements.

Companies have always found it difficult to make the transition from military to commercial or commercial to military. A different attitude in terms of cost, performance and quality is required when it is a commercial market, especially if it is a competitive one. While there have been techniques developed over the past years for the efficient manufacture of relatively large runs of electronic equipment such as television sets and radios, very little attention in the past has been paid to the special problems of short run manufacture that are encountered in the instrumentation business. Many companies, including Kin Tel, have spent a considerable amount of development time pacing their manufacturing improvement right along with their new product development. In the end analysis, the manufacturer's ability to convert the technical ideas of its engi-

neering department into profitable products is the real test of the development programs.

Too frequently in engineering or technical organizations, development of production techniques has been neglected. In this regard a very important factor in the manufacture of electronic instrumentation is the expansion of manufacturing services. Such things as sheet metal, transformers, resistors, painting, can be procured on the outside. In many instances, however, development of a new product hinges on improvements in components and fabricating facilities. Not only is the manufacturer who incorporates these functions within his own facility apt to have more labor and raw material in a product, and consequently more profit, he is also in a position to advance the state of the component and service art.

A NEW BREED OF PEOPLE

The electronic industry and its personnel requirements seem to parallel a broad range of technical industries in the country today. It is becoming quite apparent that at all levels of industry and government a growing need exists for a new breed of man. This man must be capable of interpreting technological advancements. And, if he is to accomplish the desired results within the limits of economic possibility, at the same time he must have sound business judgment to assure the efficient use of our technical manpower. The profit consequences of new technological developments must be more seriously considered. Too frequently we neglect the impact of a competitor's technical progress or even our own, in terms of creating product obsolescence and changing markets.

In the past many of the developments within the electronic industry would not have been possible if the government did not finance the significant risks which were involved. In the next five or ten years many of the developments which have evolved as a result of our military requirements will be converted to commercial products. The tremendous technical budgets of our military establishments and the affect that they have had on the economy of our country surely should stimulate industry to economically convert these ideas to peaceful products with broader markets.

INSTRUMENT COMPANY CHECK LIST

From an analyst's point of view the important thing is—Will new products and new companies make profits and reward the investor. Too frequently new companies do not even pass this basic test. It is important that the company fit its products and that the products fit the facilities. Merely because a group of engineers come up with a new idea doesn't mean that their employer is in a position to profitably manufacture and market it. When new products are undertaken it is important to be sure that there is sufficient pertinent experience within the company to effectively develop and market it. That is, of course, if any experience at all is available in the product area. Many times one company will spend a considerable amount of money in developing a new product, their cost being increased because of their inexperience in the particular field. No sooner have

they placed the product on the market when a competitor with experience in the market "leap frogs" their development as a result of a bit of technical information that the product has made obvious.

Another factor of importance in product planning and development is whether or not the cost of the ultimate product has been accurately forecast. A product which originally starts out to have a target selling price of \$500 will have a given market, but at \$5,000 will have but a fraction of that market. The basis for amortizing investment and generating leverage and profit is obviously quite different as price varies. If a product is launched which requires a new marketing organization we should not underestimate the cost and time involved in the creating of the new organization. Again, just because a product can perform a particular function, if the manufacturer is not in a position to communicate and exploit the market di-

rectly, his engineering development time and money may well be wasted.

Many companies in the electronic instrumentation business have been started by engineers with little business experience and while many engineers have developed into excellent business managers, one must be sure that all the basic organizational positions are filled with the company and that there is depth, so that the investor is not dependent on one or two individuals. It is equally as important that there be product depth so that the company is not dependent on one product, which might be obsoleted by technological development of a competitor. Technological know-how is listed last. Generally this is the factor that is ever present in most electronic companies. Electronics is no different from any other business. Technology is merely a fuel; management and organization are required to profitably utilize it.

Factors Affecting Profit in the Scientific Instruments Business

PHILIP S. FOGG

Chairman, Consolidated Electrodynamics Corp.

GENTLEMEN, I have a difficult assignment today. I have the task of telling you how one goes about making a profit in this business. It seems from the records which we have been turning in lately that you might have some questions as to whether we know much about this subject.

I think it is important to recognize, and particularly those of us in the industry, that we are judged by you people, by our stockholders, and by the business fraternity at large on the basis of whether or not we are able to make a profit. This is a dismaying situation to find ourselves in at times because I frequently think the accomplishments we are really proud of are the remarkable technical achievements that we are able to make from time to time that make headlines all over the country. Sometimes we are inclined to feel that we are entitled to a badge of honor for our success in the technical area, notwithstanding the fact that our operating statements may not look so good from time to time. If you read the financial reports that many of us are sending out these days you must be struck by our standard excuse, "Our record was not so good this past year, but we made a really big investment in research and development and things are going to be all right tomorrow."

I have been tempted to assemble a number of such stock phrases as a basis for my next annual report. Perhaps my colleagues in the industry would pay handsomely for such a booklet!

With your indulgence today, I would like to take the final part of our program to dissect, if I may, some of the factors which result in profitableness in our business. I would like to put each one of these, as best I can, under the microscope to see what influences are affecting these

particular factors and perhaps with this technique we can distill some conception of profitmaking in electronics.

Let me hasten to define what I mean, for purposes of this discussion, by the electronics industry. I am talking about the *instrument* business. There are many phases of the electronics business, many of which I know little about. I am just glad that I am not in the television or radio business or in any business making consumer products, because of some of the complexities of understanding consumer psychology. I do sometimes wish that I were in the components business, however, when I see what some of our suppliers charge us for what we have to buy. I am discouraged at times by the degree of Government business in which we become involved, the problems we have arguing with contracting officers and auditors in trying to come out with some reasonable degree of profit. So, with your permission, let us narrow the discussion today to the field of instrumentation, with the primary emphasis, if you will, on the industrial field.

Let us examine again the factors which working together result in a profit or loss in a business. We have basically the same factors influencing profits in our company and in our industry that other industries have, but I think the forces working on them may be a little different in some cases and perhaps with somewhat different results. If you will bear with me, I will try to discuss each of these individually and then we will see how they fit together.

First of all, there is selling price. At nearly every directors' meeting that I attend in my company, particularly after a bad month, some director says, "Well, why don't you raise the selling prices." Nothing to it! All you do is raise the selling price and you have a nice profit!

Certainly the price at which you are able to sell your products in the market is one of the great determinants of your profits and we do have, from time to time, some very unusual sales opportunities because most of us in the instrument business are working on the frontiers of technology and quite frequently, with a little luck, we turn up with a new device, which is a big step forward and which is of great economic use to our potential customers. Under conditions of this kind we expect to get back from the customer a fair share of the savings that he makes in the application of the new instrument, although often we are a little slow in recognizing this.

I remember that the first mass spectrometer we sold in the fall of 1942 was priced at \$17,500. After we had sold a few of them and had the good fortune to get some figures from one of our customers, we found out that one customer was saving \$17,500 in the cost of sample analysis in the first six months using this instrument. We did not think we were getting a very fair share of his economic use of that instrument, so the price today is \$55,000! In 1958 dollars, of course.

I think this is fairly characteristic of new instruments as Dave Packard has pointed out. You often have an opportunity in the early years of a new instrument to profit very handsomely because you can charge a price considerably in excess of all your costs and leave a nice margin of profit.

This happy situation does not exist forever as Dave points out. If you have an instrument with a good margin of profit a lot of people in this country try to do something to "get in on the gravy train." Unfortunately patent protection is not very much protection in this business of ours. You have to be prepared for a lot of smart technical people around the country working on ways to get around your designs and developments and they do it, too. So we go through a cycle. Competition begins to increase one day and you have to lower your prices. Your costs are probably beginning to go up. Your market is thinning out sometimes and you may run into a problem of potential obsolescence, which may come from your competition or even from within your own laboratories. One of the instructions we give to our development group is that they spend a good share of their working hours trying to obsolete what we are now selling. The reason we do this is because we often have to before our competitors do. We recognize that with the technical frontiers moving along fast these days that this is very likely to occur.

Thus, there are a variety of influences affecting the selling prices and in examining the companies that you people have to look at you may well see situations where the company has had the good fortune to get a good step forward in technology, is able to produce an instrument which has a high economic value in the hands of the customer, and, therefore, is able to obtain an unusual margin of profit. When you see these situations, I think you can be assured that in the course of time the margin is going to narrow for reasons that I pointed out.

So much for the selling price as a variable. Another big variable factor is manufacturing costs. These pose some peculiar problems in the electronics industry, in the instrument business side of it anyway, because first of all we do

not ordinarily have a large enough demand for any given item to set it up on a mass production basis, nor to worry about the pennies in the cost of production. We worry about the pennies all right, but it is not because of our ability to reduce those from the standpoint of mass production. Most of our work in the instrument business is a short-run, small-run operation. There are some areas, of course, for efficient manufacturing techniques, but actually the great area of potential progress in manufacturing efficiency is at the engineering end.

The engineer's conception of an instrument, how he designs it, and how it is finally presented to production is probably the biggest determinant of what the manufacturing costs of that product are going to be. We must bring the manufacturing people into the design process at the proper stage so that their thinking can be brought to bear on the product *before* it gets to manufacturing. We are doing in our company, I think, some very interesting things in this area. We are finding for example that the progress in the development of various plastics is now making it possible to use plastic material for many parts where we formerly had to use metals. I was shown the other day an example of a very complicated part which we had "hogged" out of metal at very high cost. I think this particular part was running about \$28 a part when made with metal. The development of strong plastics with the right kind of properties have made it possible for us to mold this part of plastic with the precision and the strength and the weight that we need. I think the revised cost was about 28 cents a unit instead of \$28 in this particular case.

Some of the other advances in the production field have to do with modular concepts, the use of printed circuitry, and the use of transistors. A great deal of this progress is dependent upon progress made by the component manufacturers themselves. Their progress determines very much what we are able to do in the design of products and in resultant effects on our manufacturing costs.

I do want to point out that if you are wide awake and on your toes, there is very great opportunity for cost reduction at the manufacturing end in the instrument business, even though it is on a small lot basis, but the factory cost reduction is primarily in what we call the product engineering function, which in our company happens to be under the engineering department.

Another variable factor is the sales function. Dick has given us a very nice run down on sales and marketing problems in our industry. I would only add this comment, that looking over the trends in the industry, it has seemed to me that the sales function had been neglected by too many electronic companies. This may be due to the fact that so many of these companies have developed their businesses by hiring a smart man in Washington who had the right contacts and was able to get some contract business which enabled them to put their engineering and production facilities to work. By this means, of a man or two at the government contract end, they were able to generate enough business to make a respectable start in this field.

It is quite apparent to all of us, I think, in the industry, however, that competition is growing, that we have got to do aggressive selling, get out and pound the pavements, and

search out potential new uses and new customers and this costs money. I have a friend in the instrument business who has an excellent small company, who has always been able to get along, proudly, as he says, with two salesmen. He has been losing ground competitively in the last couple of years and has finally recognized the need for more aggressive selling. So he established a district office set-up for distribution, but when he analyzed the costs of this new staff, he was dismayed to find that the major portion of his profit margin had disappeared. Instead of spending the fifteen per cent of sales that most of us in the instrument business have to spend for selling, he had previously been getting by on about two per cent.

This is one of the things that I would look for in studying electronic instrument companies. What is their attitude toward the selling function and how strong is their selling organization? The smaller companies are handicapped, in very often not having the resources to afford an adequate selling organization. We certainly have found this true in our own past.

A third area of variable factors affecting profits I have rather loosely classified under the heading of administration. This is an intangible factor very difficult to evaluate and measure, but of most importance, because I am firmly convinced that no company in our business is any better than the people who run it and work for it. The ability to organize the corporate activities to meet the challenges of the particular size and the particular industry being served, and to build a team which will work together and furnish the incentive and the inspiration for the enthusiasm which is essential, is a very very difficult problem and a very vital one. This requires very careful study on the part of you people who are trying to evaluate electronic companies.

As another phase of the administration problem, we should mention the problems of good financing. Building the capital structure of a company and tapping sources of capital with a well-balanced capital structure is a very difficult problem and one in which many companies in our industry have had very little experience. We have seen, because I am fortunate to have a very good financial man in my company, some very remarkable savings over the last few years in terms of proper financial decisions. Here is an area which can have a very marked effect on profit.

The final area, in which incidentally I will try not to duplicate what Dave Packard has told you, has to do with research and development. I will make some comments which may vary a bit with Dave's, but I would certainly emphasize Dave's main point which is first that you have to be sure you understand what is meant by research and development.

For example, let me tell you what we mean by it at Consolidated and use this as one example. We spent, last year, nearly \$4 million on our research and development program. Of that total, only about one-third was spent in the area of new products and fields of new investigations. Forty-five per cent of our research and development budget is for product engineering. Product engineering in many companies is handled as a *manufacturing* cost. People often ask, "Why do you spend 11% of your sales dollar on research and development?" I could cut that figure down

easily enough, by shifting the product engineering function over to the manufacturing department. Of course, my cost of sales would be proportionately higher!

I think that in investigating companies you ought to determine how they classify research and development. Seventeen per cent of our budget goes for what we call sustaining engineering. A good part of this is creative engineering work because we are keeping existing products up to new technical standards particularly where we are re-designing problem parts. One of the difficulties in this business is that although the prototype may operate perfectly in the lab, it has a habit of developing troubles when it gets into the customer's hands. This is typical. One has to be prepared for this. Instruments are just ornery things and preparations must be made to take care of these problems after the initial instruments are in use in the field.

We are also continually studying our products in terms of modifications which might reduce manufacturing costs. Investigations of new plastic parts, which I mentioned, is an example. Some redesign is usually necessary to make effective use of such new parts or materials.

This is the way our research and development program breaks down. A part of this activity is organized in what we call a research department. We are doing very little fundamental or basic research in this department. It is principally applied research, but this small group is composed of very able people with a broad assignment. They are investigating various advanced areas assigned through our general development program, which require research skill. We think this is a very vital part of an over-all sound research and development program.

The point I want to emphasize about research and development costs irrespective of their classification has to do with the effect of such costs on profits, because here is an area where top management has an opportunity to make a decision as to the magnitude of expenditure. It can be little; it can be large. We are automatically committed to costs in manufacturing as well as in the sales and administrative areas, related directly to the scale of operations. But in the area of research and development we have an opportunity to set our program at any level we wish. We could cut our research and development costs to zero if we wanted to. This is our prerogative. There might be some question as to where we would be in business in a couple of years if we did so, but here is an area where we can make decisions. At the other extreme, we can decide, if we wish, to set up a research and development program that brings the company out with exactly zero profits. So there is a wide range of decision making here as to how much money you are going to spend.

Generally speaking in our business we do not lack for ideas and opportunities. Dave has pointed that out where some of those ideas come from. Generally speaking we are overloaded with suggestions and ideas rather than having to search around to find new projects in which to invest. So we have to select and eventually to set some point at which we say to ourselves, "This is the amount which we are going to allocate for research and development." This is a decision of top management which has an enormous bearing on profits.

I have often wondered what my stockholders would say if I were to say, "We are going to set a research and development program of such proportions that for the next few years we will have zero profits, but we are going to generate therefrom a most magnificent future. Instead of growing 20% a year we are going to grow at 100% a year for the years beyond." Is this the kind of program my stockholders would like or do they want something else? To what extent are we justified in spending today's profits to buy a more entrancing future. Obviously, there must be a happy medium somewhere between current profits and future growth.

The point I am trying to get across here is that management has to make this most important decision. In our case, we have for many years allocated 10-15% of the sales dollar for research and development. This has become a habit. I am not sure it is the right habit. We have bought ourselves, between the period of 1950 and the end of 1956, about a 40 per cent a year growth. I think that management in the instrument industry has to recognize that if we spend these research and development dollars effectively then the degree to which we spend determines the rate of our future growth.

I personally am convinced that a company of our kind, at least, is much better off with a twenty or twenty-five per cent a year growth than it is with forty per cent. We found last July 1st, for example, that half of our 3,500 people had been with us less than one year. This is what happens when you grow at a forty per cent rate. In the tight labor markets in Southern California we are often hiring people if they could breathe! One advantage of the recession perhaps has been that we have been able to remove some of the people who could only breathe!

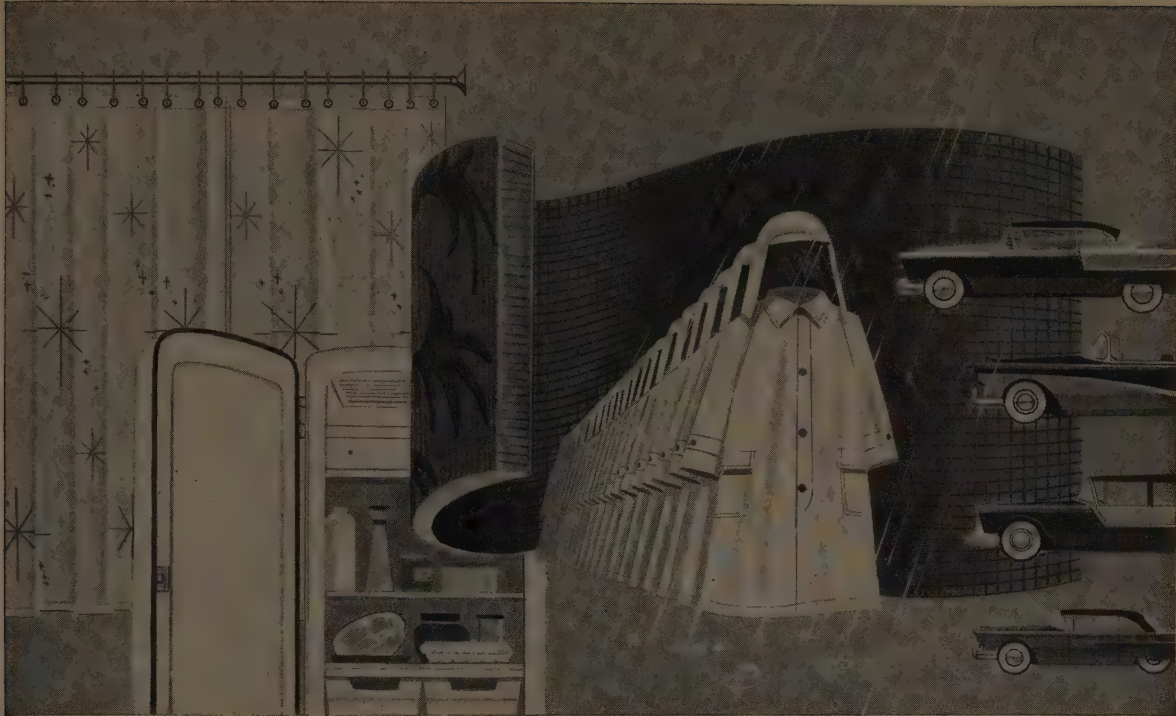
There are other interesting problems in the research and development field. For example, as you know, if you have studied our picture several years ago, we initiated a development program in the digital computer field. We had, I think, outstanding technical achievement on this project and finally developed a complex and expensive digital computer. We started out to sell these machines and made a few cash sales, but to our dismay almost every customer wanted to lease the equipment. We also found that our principal customers were not industrial, but commercial companies. The banks and department stores and insurance companies were interested and we did not have a sales force adequate to cover that kind of market well. Then we sat down and did some real soul searching. We found that the ten-year outlook in this field was entrancing, but that we needed about \$50 or \$60 million of capital to get there. We did not have this amount of capital and there was not any way we could get it in a company our size. It was just a good stroke of luck that the Burroughs Corporation came along at the right time and wanted to buy our computer division.

Sometimes this happens with new instruments and we ought to have enough information ahead of time, which we perhaps lacked in the computer project, to visualize what the capital requirements and the manpower requirements

are to see a project through to profitable operations. This takes some doing and sometimes you get a "bear by the tail," as we did. It is distressing to start a project that has some long-range potentials and then discover that resources are insufficient to exploit these potentials. Sometimes such a project is carried on to the point of financial disaster because of an unwillingness to stop and accept the losses of past expenditures.

This is an area which I think you people as security analysts will have great difficulty in evaluating, because none of us like to expose to you on the outside what we are doing in our development programs. We like to keep this a little secret to spring on our competitors (usually they know about it and you do not), but I think that if I were evaluating a company in the electronic instrument business the first thing I would want to know is exactly what its research and development program was, how well they were doing, and what the potentials in each thing they were trying to develop might be. Some of you have asked me those very questions and I hope I did not give you much of an answer!

Let me summarize, because we want some time for questions. The point I am trying to make about our business is to emphasize some of these influences that affect our profits and some of the things that you ought to look for in examining electronics companies. I hope that you will get out of this the distinct feeling that it is just as hard to make a dollar in the electronics instrument business as it is in any other business. It is a real tough job, and the only advantage we have is that we are in an industry which possesses a great growth potential. I stated before that when we are deliberating on our development program we do not lack for opportunities; we do not lack for suggestions and ideas as to how to spend our development money. Our problem is to pick from the range of ideas those things which are likely to make us money. This is usually the most difficult thing to forecast. We need a better crystal ball than any Hindu ever had. We are often trying to forecast a market for a new instrument which the market has never seen. More likely than not the demand develops *after* the instrument becomes available. We need a strong sales force. We ought to have competent manufacturing tied closely with the engineering function, particularly with what we call product engineering. We ought to have a sound and flexible organization able to adjust to the problems of growth. During the last two years we in CEC have gone through a very difficult program of reorganization from a central to a divisional structure around product areas and this has just caused us many headaches. In addition, the recession has amplified our troubles, but the job is just about done now. We must be awake to these organizational problems. We must detect the kind of skills we have and need in *all* these functions and get them. Then we must build them together as a good team. We need financial skill. If we can do all of these things, I think the odds for profit-making in the electronic instrument business are as good as they are in any business in spite of interruptions from occasional downswings in the business cycle.



PLASTICS

another multi-billion-dollar industry
served by **KOPPERS**

Last year, plastics production set another new high when 4.4 billion pounds of synthetic resins and celluloses went into plastics. In the next three years, production is expected to increase at least 14 per cent a year as uses for plastics continue to multiply.

In the home you may soon see entire translucent roofs, fluorescent ceilings, movable interior wall partitions, and even electric appliances made from plastics.

In supermarkets you are now buying tomatoes, ice cream, and cheese, as well as many other foods, in low-cost, disposable plastic containers.

The building industry now uses plastics for wall covering, flooring, glazing, paneling. And foamed plastics are used to insulate curtain walls and other types of "sandwich" panels. New jobs for plastics are being found every day.

Use of plastics in housewares, toys, packaging, sporting goods, power and hand tools, electric components, and now

missile and rocket parts continues to grow in variety and volume each year. Manufacturers of automobiles, refrigerators, and lighting fixtures are applying plastics more widely.

Koppers makes many plastics—rigid and flexible, for molding and extrusion, for films and monofilaments. **DYLAN**® and **SUPER DYLAN**® polyethylenes, **DURETHENE**® polyethylene film, **DYLENE**®, **EVENGLO**® and **FIBERTUFF**® polystyrenes, and **DYLITE**® expandable polystyrene will be performing in many of these new applications.

Koppers Chemicals also will be contributing to growth in the uses of plastics. They are used in plastics production as antioxidants, light stabilizers, and plasticizers. Koppers Company, Inc., Pittsburgh 19, Pennsylvania.

Producers of tar products, chemicals, plastics, wood preserving materials, treated wood, metal products, and dyestuffs . . . designers and builders of steel mills, coke ovens, and chemical plants.



KOPPERS

WHAT THE MERGER OF ARMCO STEEL AND NATIONAL SUPPLY MEANS TO INDUSTRY AT HOME AND ABROAD

The merger of The National Supply Company into Armco Steel Corporation brings together two well-established companies whose facilities and markets are complementary in the fullest sense. Each company will add to the strength of the other and thereby bring new and better products and services to industry at home and abroad.

The effect of this alliance on the future of both companies and, indeed, on industry itself, will be of far-reaching importance.

To begin with, Armco is known as the company "where new steels are born." It is a leader in the field of steel research. For more than half a century, the many new kinds of steel and steel products developed by Armco have helped steel users in this country and overseas to reduce costs, increase efficiency, broaden markets.

For its part, National Supply is one of the largest producers and distributors of oil field products. It serves the oil industry through a network of company-owned supply stores located in every major oil field in the United States, Canada and Venezuela. Its welded and seamless steel pipe, oil field machinery and equipment are known the world over.

Now, with the combined resources, research facilities and technical know-how of the two organizations, the opportunity to serve the customers of both becomes even greater. Many of the advantages to be derived from this integration will soon be apparent. However, the full benefit of the merger will not be attained immediately due to contract commitments.

Customer relations will remain unchanged. The policies and principles that have so successfully guided both Armco Steel and National Supply in the past will not be altered by the merger.

It is the sincere belief of the management that the wide scope of opportunity offered by the unification of these two already strong and successful companies will mean a new era of growth and progress.



R. L. Gray

President, Armco Steel Corporation



A. W. McKinney

President, The National Supply Company

MISSILES AND SPACE TRAVEL

The Future of the Manned Aircraft

HALL L. HIBBARD

Senior Vice President, Lockheed Aircraft Corporation

EACH DAY IT BECOMES increasingly apparent that commercial supersonic air travel is no longer just a possibility or a probability. It is a certainty. This is not a prediction or idle speculation. At Lockheed we are deadly serious about it. Such an airplane could be started early in 1959. The prototype could be flying in three years.

We know this for several reasons—one of which is that our F-104 Starfighter jet fighter, now in operation with the Air Force, and our X-7 ram-jet test missiles are traveling faster than we had expected them to do with a given amount of thrust.

Four or five years ago, before this aircraft first flew, aerodynamic calculations throughout the industry concerning supersonic airplane performance such as the F-104 were on the conservative side. We made a pleasant mistake—we misinterpreted the action of air at high speeds. We calculated that the increase in drag as speeds increased would be higher than it has proved to be.

AERODYNAMIC PHENOMENON HELPFUL

Jet engines, too, have been helped by aerodynamic phenomenon. This is because each of the blades within the jet engine's compressor and turbine wheels is in effect a miniature wing "flying" at extremely high speeds. The over-all effect is high and efficient thrust at sustained supersonic speeds.

Because of the high temperatures generated by air friction in sustained supersonic flight, we will make much greater use of steel and titanium in constructing the supersonic transport. Also, the design of an adequate cockpit and passenger cabin refrigeration system will be tremendously important. Such a plane will need no heating system in flight; merely a lessening in refrigeration will handle the problem!

By "supersonic" travel I mean speeds around Mach 3, about 2000 mph. Oddly enough, Mach 1.5, about 1000 mph, presents just as many problems, and so we are not even thinking about such a relatively low speed.

I believe that for convenience, operating economy, and frequency of schedule the supersonic transport should have a carrying capacity of 90 to 100 passengers. It could, of course, be smaller or larger. We can give the airlines what they want. Airport field length requirements for takeoff and landing will be somewhat less than needed for the

subsonic jets now on order. Why? Because the supersonic jet will have enormous power and a surprisingly large wing, a wing area large enough to fly efficiently at altitudes of 70,000 to 80,000 feet.

THE VERTICAL TAKEOFF AND LANDING PLANE

Aerodynamic scientists and engineers are making rapid progress in this field. They are vigorously pursuing studies that can lead, possibly sooner than we think, to the inter-city, downtown-to-downtown type of air transportation vehicle. It is a big field. Hundreds of people are working in it.

Of designs now being developed and tested, probably the tilt-wing idea is the best known. It works. But it will not be the final answer. In my opinion the solution will lie with an augmented jet type of lift.

I do not have to tell you that an airplane like this is badly needed. Probably it will carry 30 to 40 passengers. I foresee regular flight schedules from, say, Los Angeles to San Francisco every half hour—speeds of 500 mph—an elapsed time of 45 minutes between those two cities. And that is downtown to downtown, not airport to airport.

PRIVATELY OWNED AIRPLANES

I am sorry that the ideal private owner plane, which is closest to my heart, appears to be the farthest away in point of attainment. Again I think that a ducted fan engine with an augmented jet is the key to solution of the problem of providing the average man, the average family, with safe, cheap, personal air transportation. It is probable that out of experience gained with the larger VTOL design will evolve such a personal aircraft.

In the past my forecasts about when we will have big, useful, high performance airplanes in operation have been too conservative. On the matter of private planes I am sad to say my forecasts have been too optimistic. Perhaps this time I am right when I say that although the objective is not yet at hand it may be very close.

THE CARGO PLANE

There has been some lack of understanding and knowledge of the true role of the manned airplane in transporting cargo and freight. But the turbo-prop or prop-jet aircraft, such as the Lockheed's C-130 Hercules airfreighter, already is beginning to demonstrate the advantages and the un-

limited future that lies in the volume handling of cargo by air.

Steamboats, railroads, airplanes—each new advance in the history of transportation has followed a consistent pattern. Each began by carrying passengers. Subsequently each took on cargo and freight. For the railroad and shipping industries this cargo business has become more important than the carrying of passengers. It is inevitable that freight will become just as important a factor in aviation.

The prop-jet airfreighter like our Hercules is an outstanding performer. And that's what pays off in the cargo carrying business. It can haul goods from one place to another at lowest cost. It shatters the business axiom that speed costs extra. Airfreighters of this type will, I believe, always require airport runways, because in this manner their basic design allows them to achieve the lowest possible cost per ton mile.

I am convinced that railroads, bus lines, and seagoing vessels will eventually go out of the passenger business entirely. I am sure that all passenger travel will be by air, and I mean *all*, including commuting to and from the office and weekend pleasure trips.

THE MANNED MILITARY AIRPLANE

I suspect that the two speakers who will follow me—Dr. Dunn and Mr. Dempsey—are going to dwell largely on the exciting topics of missiles and of travel in outer space.

I do not know, of course, what they are going to tell you. But before I close, I would like to say, in the most emphatic way, that I am absolutely convinced that the days of the manned military airplane are not numbered. The new high speed and vertical takeoff planes that will prove so useful in commercial and private flying will have their counterpart roles in the armed services.

We need and will continue to need manned aircraft of many types for missions of defense, to deter aggression, to fight large or brush-fire wars if necessary. We need them to guard against threats from enemy missiles, submarines, high altitude and low level bombers, surface vessels, and ground forces. We need them for transport of military personnel and supplies, for communications and patrol, for training and combat proficiency, for rescue and special missions.

The missile, you know, cannot do everything.

Development and Manufacturing Problems

J. R. DEMPSEY

*Manager, Astronautics Division
Convair Division of General Dynamics Corp.*

THERE HAS BEEN a good deal of discussion about missiles and airplanes this afternoon. I would like to talk about how they are alike, and how they are different.

The two are quite alike, in that they have to obey all the laws of nature. Missiles are unmanned; that is the only fundamental difference.

In missiles, the designer is freed of the requirement for carrying a man. Since the missile does not have to be brought home, it need be only half as large, perhaps, as an equivalent airplane. But that is the end of the advantages of having no man aboard.

One great disadvantage is that the missile lacks a man and his judgment when something goes wrong. Without a pilot to take corrective action, the missile is lost. Hence, reliability becomes a very large factor. To illustrate what this means, suppose that we have 100 series elements, each of which has a reliability of 99 per cent. The reliability of the whole—the probability of a successful flight, in the case of a missile—is only 36 per cent. This gives you an idea of the problems we face in developing a thoroughly reliable missile.

This leads to several differences in the way missiles are built, compared with planes. In developing a new plane, the test pilot makes a series of flights, and reports what is wrong, and "fixes" are made sequentially. In missiles we

can do this to a limited extent—but every time we test a fix, we lose a missile.

The result is a major manufacturing problem at the time we can least afford it, in the period when we are still inventing the missile. When we fire a missile and conclude from the data that a change has to be made, the change has to be made all the way down the line: in missiles ready for firing, in missiles on the final assembly line, in components in the sub-assembly departments, and out among our sub-contractors (and in the Atlas program, we have them in nearly all of the 48 states).

Test-flight instrumentation of missiles is a substantial problem in itself. We take more than 200 measurements during a flight, recording something like 200,000 data points. Measuring equipment, together with the range safety equipment a missile has to carry, weigh more than all of the other electronic systems in the Atlas.

A significant difference between missiles and planes is found when we study the ratio of development effort to manufacturing effort. In my own organization, we have one engineer to each manufacturing employee. In other Convair divisions, working on aircraft, the ratio is approximately one engineer to four men in the factory.

Another interesting ratio is that of development costs to total costs. The enormous efficiency of the missile weapon

system is such that we do not need to make many missiles, but the development costs are still high. Fifteen years ago, only 5 to 10 per cent of the cost of a new weapon went into development; the rest went for production. Today the development costs are more like 50 per cent, and of course this trend applies to advanced planes as well as missiles.

This situation raises a question of profit patterns. In development work, one does not know costs well enough to forecast them accurately, and the Government uses the cost-plus-fixed-fee system. The theory is that the manufacturer takes little risk, and hence the profits should be held low. However, the costs of operation remain very high in devel-

opment work, and it appears to me that there must be a change in profit patterns.

The bookkeeping effort alone is very large for the "systems integrator" in a weapon system program. To illustrate, about 65 per cent of all the dollars we receive from the Government are passed on to our subcontractors. We have more than 2,200 of them scattered around the country.

Managing a weapon system does not consist primarily of assembling all of the people you would need to do everything that has to be done. Rather, it is a matter of acquiring people who know enough about everything to keep track of it all.

Space Flight

DR. LOUIS G. DUNN

*Executive Vice President and General Manager
Space Technology Laboratories
Division of Ramo-Wooldridge Corporation*

I AM GOING TO TALK to you about space flight, which is a broad and rather difficult subject to discuss. Not only is it complex from a scientific point of view, but it also poses fundamental questions concerning individual values and objectives, as well as national economic and military values. Today, however, I will discuss only technical aspects of space flight.

Space flight, although not simple, does relate to a simple concept—the minimum velocity required for any given space flight mission regardless of vehicle design. For various types of ballistic flights, say from one point on the earth's surface to another, or flight into a satellite orbit, or flight to the moon, or flight to another planet, there is, for a given burnout altitude above the earth, a minimum velocity. Achieving minimum velocities is now possible because the velocity for an intercontinental ballistic missile flight is a large fraction of that required for space missions. For example, launching a satellite into an orbit 200 miles above the surface of the earth requires only about 10 per cent more velocity than an ICBM requires, a flight to or around the moon requires only about 60 per cent more velocity than an ICBM requires, and only small additional velocities over that required for flight to the moon are needed to reach Venus or Mars. It is also interesting to note that the ICBM itself requires over 60 per cent more velocity than an IRBM, about 350 per cent more than a 200-mile ballistic missile, and about 1000 per cent more velocity than the very fastest conventional aircraft.

Because at the present time we, as a nation, have a large ballistic missile and satellite development, it is of the utmost importance that we capitalize on it to speed our initial steps into space. Although much is done, there are, of course, many unknowns, not, however, with putting a vehicle in space but rather with sustaining a man in that

vehicle. For example, we do not know how well man can think in space or exercise judgment under conditions of zero gravity. Until we know the answer to this problem, we cannot determine whether or not the flight be automatic or the man left in control or in partial control. These are only a suggestion of the unknown quantities confronting space scientists and engineers today.

Another item of great importance is that of communication. Should constant communication be maintained? If so, it will require a tremendous amount of effort and money, since this would basically require a worldwide communications network. If, on the other hand, short intervals of contact are found adequate, for example, once every 20 to 30 minutes, then the communications problem can be greatly simplified.

Despite all of these problems, at present it is clear that existing missiles with the addition of relatively small added stages can be used to carry sizeable payloads to or around the moon and to Mars or Venus. In fact, the payload carrying capabilities of ballistic missiles in the Air Force ICBM program provide the foundation for manned space flight. Present equipment with a relatively small investment can take two men and orbit them around the earth, or can carry one man around the moon and return him to earth, or can be used for scientific exploration of Mars or Venus. Although there are still many unknown details, they are in regions we already know.

As to the future of satellites, perhaps one of the most interesting possibilities is that of placing a satellite into orbit on an equatorial plane having a 24-hour period. It would then stand still with reference to a point on the earth. It could serve invaluable purposes as a relay station for worldwide communication.

Although satellites and ballistic missiles have begun the

exploration of space, it is the manned space mission that excites the imagination and poses the most challenging problems. For instance, during a typical flight to the moon and back, the burn-out velocity of the last stage would be about 35,000 feet per second and would reach the moon 2.5 days after the vehicle left the earth. The distance from the earth to the moon is about 240,000 miles and the moon is moving at a speed of approximately 2,000 miles per hour in reference to an earth-centered coordinate system. Therefore, in order to either land on the moon or attempt a circumlunar flight requires a considerable degree of accuracy in the guidance system. It has been reported in various newspapers that we do not have, at present, equipment which will supply the necessary accuracy. But, in fact, we do have such equipment; the problem is not accuracy but weight of the guidance equipment. To illustrate the importance of weight, it requires between 300 to 2,000 pounds of gross weight at take-off in order to place one pound of payload on the moon. The exact value depends upon staging ratios and very strongly upon the efficiency of the last stage. Since the guidance equipment used to correct the final burn-out velocity must be carried in the final stage, its weight has a material effect on the payload, and it can be readily seen that, for a guidance system weighing between 200 and 400 pounds, one has to pay a very heavy penalty in gross weight at take-off.

Another important aspect of lunar flight is returning to the earth. The vehicle must be able to re-enter the earth's atmosphere at a precise angle in order to be properly decelerated. Should the vehicle meet the atmosphere at too shallow an angle, it would go by the earth and never return. On the other hand, if the re-entry angle is too steep, the acceleration and temperature become excessive.

Landing on the moon and returning presents a much greater problem. This involves a sequence of leaving the earth, decelerating when reaching the moon so a landing can be effected, taking off again and decelerating once again to re-enter the earth's atmosphere. In general, this requires a velocity increment of about 20,000 feet per second in addition to the 35,000 feet per second necessary for circumlunar flight. Can we do this with conventional chemical rockets? The answer is yes, but it is not economical. It will be a very expensive undertaking. We will have to develop much larger rockets than are now being used in the ICBM programs, and we should, therefore, look at other propulsion devices, of which there are three that might be mentioned briefly here.

The first is nuclear propulsion, which in principle depends on heat transfer from the nuclear reactor to a working fluid such as hydrogen. Since the reactor must be at a higher temperature than the working fluid, the temperature of the working fluid, which in turn determines the performance, is limited; and the final performance of the system becomes limited by the maximum temperature of the reactor materials.

The second is thermonuclear propulsion. In this scheme it appears possible to confine the reaction core in a magnetic field in such a way that very high temperatures can be reached in the order of several million degrees. It is, however, a very difficult problem, and it will be many years before a practical system can be considered.

The third device is ionic propulsion. This system depends upon the acceleration of mass by a suitable electrostatic field. The nature of the system is such that it would be suitable only for supplying relatively small amounts of thrust. A practical way of using this type of propulsion would be, for example, to place a large vehicle of say 30,000 pounds in orbit around the earth by means of chemical rockets, then apply a continuous thrust for the above payload of 30 pounds, which would, by slowly spiraling outwards, cause the vehicle to leave the earth in seven to eight days. Such a vehicle could make the trip to Mars in about 200 days. For comparison, a chemically propelled ballistic missile on a minimum energy trajectory would take 260 days.

In addition to the propulsion problems, we must also consider certain other aspects which must receive intensive effort in the future. One of the most important items is the electrical power supply required for communications with the earth. Today, any payload for space flight consists largely of power supply. It is of vital importance that the weight of the power supply be decreased and the lifetime be increased. Also, the weight of all electrical equipment should be drastically reduced and reliability over long periods of time should be markedly increased.

I would like to conclude by pointing out just how long man has been considering the idea of space flight. In a paper published by Sir Isaac Newton in 1687, he considered such things as orbiting around the earth, a flight to the moon, and some of the trajectories applicable to ICBM flights. Although these do not check precisely with some of our modern machine-calculated values, they are, however, remarkably close.

ALLEGHENY LUDLUM STEEL CORPORATION

PITTSBURGH, PENNA.



At a meeting of the Board of Directors of Allegheny Ludlum Steel Corporation held today, May 15th, 1958, a dividend of fifty cents (50c) per share was declared on the Common Stock of the Corporation, payable June 30, 1958, to Common stockholders of record at the close of business on June 13, 1958.

S. A. McCASKEY, JR.
Secretary

ROME CABLE CORPORATION

77th Consecutive Dividend

The Board of Directors of Rome Cable Corporation has declared consecutive Dividend No. 77 for 25 cents per share on the Common Stock of the Corporation, payable July 1, 1958, to holders of record at the close of business on June 13, 1958.

GERARD A. WEISS, Secretary
Rome, N. Y., May 9, 1958

The UNITED Corporation

The Board of Directors has declared a dividend from Net Investment Income of 10 cents per share on the COMMON STOCK, payable June 13, 1958 to stockholders of record at the close of business May 26, 1958.

WM. M. HICKEY,
President

May 14, 1958

AIR TRANSPORTATION

The Air Transportation Industry and Its Regulatory Climate

STUART G. TIPTON

President, Air Transport Association of America

IT HAS BEEN GRATIFYING to me in recent years to note that more and more favorable attention has been given to the highly significant role played in our society by the investor. Not so long ago, it almost seemed as if the investor was the true forgotten man. Of course, as there has been a development in understanding the true value of the investor, so there has been increased attention to those who are so important in accurately informing and advising investors. You security analysts with your need to know and your need to report have therefore become, and quite properly, a vital element of our economy.

Our nation, and I feel all industries and companies must recognize this, has a twin responsibility today and in the years ahead. Not only must we attain a sufficient growth so as to meet the aspirations of our people, but we are also involved deeply in a world contest between the communist and capitalist economic systems. I am sure that we did not need the reminder produced by the ton-and-a-half Sputnik that orbits overhead. This is truly an economic struggle for survival. It is within this framework that I would like to discuss with you today the problems and opportunities of the air transport industry.

The dynamic impact and catalytic quality of a basic change in transportation is well known to all of us. And the jet revolution of the airlines is just such a basic change. The jets, when they fly, will not only shrink the world by 40 per cent, but, because of their very speed and great carrying capacity, will stimulate the economy of our nation, both domestically and internationally.

This jet revolution, which will start before this year is out and reach a peak in less than three years, poses a major challenge. First, how is the industry itself responding to this challenge?

The scheduled airline industry proposes to invest close to \$3 billion in the American economy in the next five years. This will include about \$2,513,000,000 for some 400 prop-jet and turbo-jet airplanes; about \$247,000,000 for special ground facilities; and another \$216,000,000 in ground facilities covered initially by capital made available by others, but to be paid for by the airlines. It is interesting to note that this \$3 billion compares to a present book value of airline operating equipment of \$1,056,000,000.

To put it another way: the planned airline expenditures

for the period 1958-60 represent a greater increase over 1957 investments than any other major industry.

Where is this money to come from? Well, \$512,000,000 has already been spent in progress payments to meet these expenditures. Additional financing in the amount of \$745,000,000 has been arranged. However, this leaves a gap of about \$824,000,000 to come from retained earnings, additional investment, or additional loans. I might point out that only 1.9 per cent of total industry airline revenues last year came from subsidy, and the twelve domestic trunk lines are virtually subsidy free, so we are not looking to the Government for direct financial assistance.

The airlines should be, as they head into the fifth re-equipment cycle since World War II, as financially healthy as possible. Hopefully, they should even have a little fat on their corporate bones to take care of the unexpected but almost inevitable emergencies. Sadly, this is not true.

Although airline productivity has admittedly increased and improved, we have been caught in a vise of static yield and increased operating expenses.

In 1957, for example, the domestic trunklines had a total revenue of \$1,433,386,000, up 13.5 per cent over 1956, and almost double the revenue of 1952, when \$768,015,000 was grossed. However, the net profit after taxes and interest was an entirely different story. About \$53 million in 1952, and only about \$25 million in 1957. Almost twice as much business done for less than half the profit.

The profit margin, or net profit after interest and taxes as per cent of operating revenues, was 1.57 per cent in 1957, compared to 7 per cent in 1952. The return on average investment, or net profit after taxes and before interest as per cent of average yearly net worth, plus long-term debt, was 3.9 per cent in 1957, compared to 14.1 per cent in 1952. The operating profit margin was 5.41 cents per available ton mile for the year 1951, and slipped to .8 cents in 1957. Operating margin per revenue ton mile was 8.86 cents for the year 1951, as compared to 1.5 cents for the year 1957.

The primary cause was the "hold the fare line" policy of the Civil Aeronautics Board. In fact, since 1938, while the price of bus tickets had gone up 37 per cent, first-class rail tickets up 46 per cent, and the over-all cost of living up 98 per cent, the average airline fare had actually slid below the level of 20 years before. After repeated requests,

the CAB finally acted. In spite of the airline conclusion that a fare increase on the order of 12 to 17 per cent was essential, it granted early this year a temporary increase of 4 per cent plus \$1 per ticket, or about 6.6 per cent. Even with this increase, the average passenger fare will be only 1.9 per cent higher than the 1938 level.

That this modest increase is not enough is clear. In fact, Secretary of Commerce Weeks testified to a Congressional committee recently that the increase "was not adequate."

Incidentally, the public reaction was extremely favorable. One major trunkline reported that out of 85,000 advance bookings and 55,300 telephone calls, only three cancelled and a mere dozen switched to coach.

Because of this tragic trend that even the CAB has described, rather academically, as the "speedy deterioration" of airline earnings, we were not surprised when the First National City Bank of New York reported that the air transport industry showed the biggest drop in net income after taxes between 1956 and 1957 of any corporate group surveyed.

How did this come about? How did a great and vital growth industry, not only significant in our domestic economy, but absolutely essential for our international struggle with the Soviet Union, come upon such difficult economic days?

The sad fact is that some of our Government leaders were asleep in our economic control towers rather than watching, on both sides of the Iron Curtain, the development of air transport.

Let me take you back to the Spring of 1954. In March, Marshal S. F. Zhavoronkov, at that time general manager of Aeroflot, the Soviet airline, visited India, France, Sweden and Switzerland to study the prospects of obtaining reciprocal air transport agreements. The marshal was instructed particularly to enter into preliminary discussions on the introduction of Soviet jets on international routes. The first flight of the Soviet jetliner, the TU-104, took place, incidentally, in June of 1955.

While the Reds were on the move, what was going on over here?

1. The Department of Commerce budget request to Congress asked for no money for airport aid, although a supplemental request for \$22 million was later made. This compares to an expenditure of \$63 million this year and Congressional pressure for over \$100 million next year.

2. The Department of Commerce budget requested \$5 million for air navigation and traffic control facilities. This compares to \$175 million for fiscal 1958.

3. And Earl Johnson, then the president of the ATA, made a special economic presentation to the Civil Aeronautics Board, warning of financial problems ahead and asking for permission for the carriers to meet to discuss plans, which would be subject to CAB approval, on how to increase revenues. He was turned down.

Mr. Johnson went back to the CAB in November, 1954, and issued this warning:

"If the financial world ever comes to seriously question the ability of the industry to attract new capital or to regu-

larly earn sufficient funds to protect and pay for that capital, the industry's growth will be seriously impaired. It will be precluded from attaining the level of growth which presently appears possible on the horizon. And it is necessary always to realize that healthy growth is essential in this industry not only because of the obligation of the industry to provide better service to the traveling public, but in order to provide an expanding capacity to fulfill national defense requirements.

"In order to allow airline managements to fully develop all the potentials in the industry, it is necessary that a regulatory climate or environment, as well as a legislative one, exist which will allow management to consolidate the gains of recent years and to build an earnings base—a stable earnings base."

Again, action was refused. A recent report by Brown Brothers, Harriman & Company is adequate commentary:

"The basic difficulty is that the CAB continues to give no sign of recognition that the airlines face a major financial crisis. It still seems risky, therefore, to predict that the CAB will change its position in time to help the companies effect their transition to the jet age."

Suppose the Civil Aeronautics Board had responded to the industry warnings in 1954, and had granted, say, a 10 per cent increase? By the end of 1954 the profit margin was 5.3 per cent, down from 7 per cent in 1952, and lower than any year since 1949. Assuming no change in dividends, the retained earnings in 1955 would have been \$95 million instead of \$46 million; in 1956 about \$93 million instead of \$38 million; and, in 1957, \$73 million instead of about \$8 million. Even so, this modest fare increase would have meant that the profit margin would have slid back down to 5.97 per cent by 1957.

Let it not be said, however, that the Civil Aeronautics Board is the sole source of Governmental problems.

The Executive Department, apparently refusing to believe its own figures—that 45 per cent of the airway use is military, to say nothing of exercised extraordinary and priority use—has proposed a sharp increase in the fuel taxes that can only be described as confiscatory.

The Department of Defense persists in operating the world's largest airline, MATS, in spite of our proposals for partnership plans that will not only guarantee a bigger airlift in time of emergency, but at less cost to the taxpayer. This diverts a substantial amount of business that could properly go by commercial carriers.

The Department of State, although we happily understand a thoughtful internal policy review is going on, has granted foreign-flag carriers opportunities in this country far beyond any equitable economic exchange. This policy had had an unfortunate impact on domestic carriers. For instance, in September of 1957, it was estimated that foreign-flag, trans-polar carriers diverted 110 passengers a day that would normally have gone by United States-flag domestic carrier from the West to the East Coast. It is disturbing when we note that six typical foreign airlines paid their pilots on the North Atlantic route between \$7,000 and \$13,000, while a typical pilot flying for a United States-flag line was paid an average of \$23,000.

This competitive problem shows up in these passenger figures. In 1949, 22 foreign airlines shared the United States market, and 75 per cent of all the air traffic between the United States and other countries was carried on United States airlines. Last year there were 39 foreign airlines and the United States airline share had slumped to 63 per cent. During this same period, incidentally, the proportion of international passengers who were United States citizens increased from 60 per cent in 1949 to 67 per cent last year.

There are also those who insist that the airlines do not pay enough for the support of airports. In fact, the airlines paid last year an estimated 10 million dollars in airport landing fees and an additional 14 million in airport rentals—a total of 24 million dollars, or almost as much as the domestic airlines retained as net profit for the year. It is often forgotten that the airport in today's modern city is a vital economic gateway, and truly a community asset of great worth. In addition, the national airport network is an essential element of our national security—by 1945, for example, 424 civil airports had been turned over to the military and were actively employed in the war effort.

TRANSPORTATION TAX UNFAIR

While I am at it, I might as well add the unfair hangover from World War II, the 10 per cent transportation tax, which is certainly unfair to all passengers who wish to take advantage of common carriers.

It is this accumulation of problems that sometimes causes us to wonder if there is a concerted effort under way to force the airlines down the grim path followed by other United States common carriers. The railroads, of course, share our basic competitive problem—the private automobile, which handles about 88 per cent of the intercity passenger traffic—however, I doubt if it can be said that Government regulatory policy has been helpful to them. The Merchant Marine also has major problems. Four out of every five vessels entering United States ports fly foreign flags.

I do not, by any means, suggest that the Civil Aeronautics Board desires to push the domestic trunk lines back onto subsidy. However, I sometimes wonder if the shortsighted policies of the board will not have that actual result.

The underlying assumption of the CAB's approach to rate regulation seems to be that it is dealing with a monopoly industry in the classic form. I noted with interest recently that *The New York Times* reported an economist found utilities "slump-resistant." The air transport industry, as it has grown under regulated competition, is clearly a public utility, with all the obligations and responsibilities that implies. However, it is not a monopoly utility in the same sense that the telephone, gas or electric companies are.

The consumer has considerable freedom of choice. He can select among airlines in many instances, or he can travel by bus, by train, or by private automobile. Most significant, from the standpoint of airline marketing problems, he can simply decide to stay home. In terms of selling to consumers, the airlines have the same problems as any other businesses. This means that they must be allowed the economic freedom to expand and improve the quality of their product to attract customers. The airlines face a

major promotion effort in the jet age and must be permitted to earn sufficient money along the way in order to develop the market.

As proof of the dynamic selling required, it is revealing that the scheduled airlines spent over \$24 million in newspaper space alone in 1957, while the railroads spent a little over \$6 million. This is a high proportion of advertising cost to sales total.

The "police the monopoly" aspects of rate regulation are largely outmoded and archaic, at least so far as air transport is concerned. However, we are faced with a negative regulatory policy, which fails to take into account the obvious end result of regulatory action in today's conditions—the ensuring of sufficient revenue for the transportation companies so that they can properly serve the public and the national defense on an expanding basis. In addition, the proceedings are lengthy. The current General Passenger Fare Investigation was instituted in 1956 and hearings formally began in November, 1957. It is not expected that an answer will be coming down from the board until the first quarter of 1959. In addition, the chairman of the board has now informed Congress that after this investigation of earnings there will be another proceeding "of equal size" to study the general fare structure.

Unfortunately, the jet age will not wait upon this schedule.

But let us go back once again, this time to 1938, when the Civil Aeronautics Act was passed by Congress. The authors of the Act recognized clearly what dangers could arise. They saw about the financial wreckage of many railroads. So they wrote a law that they hoped would permit the air transport industry to grow under regulated competition. That the industry would not only be able to get off subsidy but would in time have the inherent strength to weather an economic slump and have the financial muscle to keep up with technological developments.

So they gave the regulatory agency the unusual directive—not only to police as a regulatory agency, but also to promote air transport for the commerce, the postal service and the national defense.

I feel the philosophy expressed in this Act is still sound. The United States Court of Appeals for the District of Columbia recently emphasized that the language in the Act was plain and that Congress intended "to utilize the abilities and capacities of the private air carriers."

Unfortunately, the CAB has seemingly forgotten its promotional responsibilities. I suppose it is hard to regulate with vigor, while at the same time making certain that nothing done by the Government impairs the ability of the industry to forge ahead. I am sure it is difficult to avoid the negative attitude inherent in regulation—and the board has not avoided it.

I understand that consideration is being given in Washington to the creation of a Department of Transportation whose job it would be to make certain that transportation is not impaired by the depressing hand of the regulators. This is an extreme solution. It seems to me that a vigorous assertion from time to time by the Congress and the White House of the national interest in air transport would do the job just as well.

The principles of the CAA are good ones. It just seems necessary every so often to remind the administrators of their existence.

As I suggested above, the question of international competition with Soviet Russia is an important factor that must be considered in any discussion of scheduled air transport. There is, of course, the obvious national defense value of a jet fleet of transports. As a part of their defense planning, the scheduled airlines have earmarked the very best of their equipment for incorporation in what is known as the Civil Reserve Air Fleet, or CRAF. Briefly, these planes are available on 48 hours' notice for any global assignment in support of combat forces. This value was recognized by the Department of Defense when it intervened in the fare investigation to declare it "is much concerned with the continued development of the air carrier industry and its financial ability to acquire and operate modern equipment on a continuing basis."

Emphasis on this direct national defense role may obscure the basic economic value of a strong United States-flag airline system. Allen W. Dulles, director of the Central Intelligence Agency, recently declared:

"It is most probable that the fateful battles of the 'cold war' in the foreseeable future will be fought in the economic and subversive arenas."

For this reason it is appropriate for us to examine briefly the development of Aeroflot, the Soviet airline.

RUSSIA'S AEROFLOT

On the other side of the Iron Curtain a going jet air transport system is now operating. And it is operating not only within, but from Russia to other countries. Just recently Russia's Aeroflot initiated service to the West at Copenhagen. They have concluded an agreement with England for reciprocal service. And they have flown their current commercial jet, the TU-104, to our shores three times. The last occasion was in early February of this year, when a Russian jetliner landed at Baltimore carrying the new Russian ambassador to the United States. It is predicted that by the end of this year the Soviets will be operating more than 100 new prop-jet and pure jet aircraft over its burgeoning world air routes.

What does this mean? It means that Aeroflot is creating the framework for a major transport organization. It is building up its domestic services and acquiring landing rights to expand services throughout the world, simultaneously with the build-up of its long-range bomber force, its missile program and its satellite program. The Soviets understand, as we should, that a strong civil air transport system will provide essential military strength, stimulate internal economic development, serve as a means of economic

penetration in other countries and as a propaganda weapon of enormous influence.

CRITERIA FOR GOVERNMENT ACTION

It is the firm belief of the scheduled air transport industry that the entire Federal Government, not only the Civil Aeronautics Board, must take into account certain criteria when it considers actions dealing with air transport matters. We suggest these standards:

1. Will Government action improve service in the public interest?
2. Will this Government action strengthen our international position particularly today with respect to Russia, since the Soviet is our principal competitor, in the world market, for ideas, prestige and power?
3. Will the Government's action serve to let our free enterprise system act as a stimulus to the economy?

The basic question involved at all times, of course, is will this action provide the financial strength and stability sufficient to accomplish these objectives?

If this great nation is to attain the goals it has set for itself, and, of course, I am speaking primarily of air transportation in this instance, then there must be recognition by the Government that a responsive and cooperative climate of opportunity is essential.

It has been said at times that management can function best when it is not harassed or snarled by detailed and unnecessary supervision. A very prominent official of a government recently announced some news as the "need to enlarge the powers of enterprise managers, to reduce the number of plan indices established for enterprises and construction projects, and to grant managers greater independence in solving technical, financial, and economic problems."

Who do you suppose said that? Who urged this policy of greater freedom for managers? I think the answer may surprise you a little. It was Nikita Khrushchev.

If the Russians can recognize which way lies the greatest possible economic growth, then certainly we can.

The recent Rockefeller report "The Challenge to America: Its Economic and Social Aspects" stressed:

"The basic factor that will determine this country's future rate of economic progress is the degree to which we keep alive the incentives upon which growth depends. . . . Without private capital for investment, we would, as we know, lack one of the essential ingredients for our growth."

If that philosophy is adopted and implemented in practical terms by our Government, then I do not fear for the future of scheduled air transport. What we ask is the freedom and opportunity to meet the challenge of tomorrow.

Regional Air Lines, Their Problems and Outlook

TERRELL C. DRINKWATER
President, Western Air Lines, Inc.

MR. TIPTON, president of the Air Transport Association has treated well some of our regulatory, financial, operations, and other problems.

I should like to talk about some of the industry's labor troubles. These, I believe, currently are as important as any we have. In the near future, they may well become our most important difficulty.

You may surmise that my strong feeling on this subject is due to the fact that Western Air Lines was selected as a guinea pig for the industry and has been grounded by a strike of the Air Line Pilots Association since February 21. I shall comment on that in a few moments.

My beliefs are not solely the result of this unhappy episode. Rather, they are predicated upon the long and costly experience of our railroads, which have for years been saddled by featherbedding union contracts. Now we see an alarming trend toward featherbedding the airlines. Featherbeds will not fly. Unless our industry halts this trend we may soon find airlines in the unfortunate situation of the railroads today. We must not repeat these mistakes.

In 1956, labor costs of the domestic trunk airlines were 50.7 per cent of the total cash costs. Even including depreciation charges in that year, labor costs were 46.1 per cent of total expense. With high demands for increased wages, pensions, and many other fringe benefits, the percentage for labor costs in 1957 and 1958 could be even higher.

With the exception of the railroads, practically all regulated public utilities have a considerably lower percentage of their total expenses absorbed by labor costs. In the railroad industry, for Class 1 Railroads, labor costs in 1956 were 66 per cent of total operating expense. For Class A and B Electric Utilities, they were 25 per cent, and for natural-gas pipeline companies only 10 per cent.

You are all generally familiar with this particular railroad headache. The lead editorial of "Barron's Weekly" on April 28, noted:

"For decades the featherbedding of the railway brotherhoods has been an open scandal. In a particularly notorious and costly abuse, one union, in both the United States and Canada, has insisted on stationing a fireman on diesel locomotives, where he has little or no useful work to do."

In an excellent analytical speech last year, entitled, "What Is the Matter With the Railroads?," Ben W. Heineman, chairman of the Chicago, and North-Western Railway Company, made this amazing statement:

"The railroads, as an industry, set an example of sheer economic waste without parallel in the history of our country."

Mr. Heineman points out that a great portion of this economic waste is directly due to featherbedding. He cites the use of three engine crews in seven hours on the run

from Chicago to Minneapolis, with each crew getting a full day's pay; and one crew from Chicago to Milwaukee getting almost a full day's pay for 81 minutes of work.

Many of you can recall other illustrations of these expensive practices which the present managements of our fine railroads have inherited, and which they are now finding extremely difficult, if not impossible, to change.

In my opinion, those of us who are responsible for the management of the airlines have a strong obligation to the traveling and shipping public, our security holders, our bankers, and all airline employees, to make certain that in the years to come future airline managers are not saddled with such a miserable inheritance.

Mr. Tipton referred to the urgent need of our industry for a realistic passenger fare increase. I am confident that in due course this must and will be permitted by the Civil Aeronautics Board. But unless the featherbedding trend is halted, this fare increase will not for long be sufficient. We shall soon find ourselves in the same dreary status the railroads occupy today.

Wasteful railroad featherbedding wage structures have been permitted to continue and in some cases even expand. The result has been that after each such inflationary increase in wage costs, with no corresponding increase in productivity, the railroads have been obliged promptly to petition the Interstate Commerce Commission for an increase in fares and rates. This they have been doing for some years, and each time getting some increases. Because of this process, in many instances the railroads have now priced themselves out of the market, to the benefit of the airlines, trucks and busses, perhaps, but to the detriment of the railroads' security holders, bankers, employees, and the travelers and shippers obliged to use railroad services.

For illustrative purposes only, and without undertaking to debate issues which are of no direct interest to you, may I now refer to the Western Air Lines pilots strike.

Western's pilots are represented by the Air Line Pilots Association (AFL-CIO), with headquarters in Chicago. The same union represents the pilots of practically all scheduled airlines of all classes operating in the United States. The union is now involved in contract disputes with a majority of the airlines.

Western has 263 pilots represented by the union. These pilots comprise 10 per cent of our total employees, yet they received, in 1957, nearly 25 per cent of the total wages and salaries paid by the company. The pilots received more than 60 per cent of the company's total pension contributions in 1957.

This group is the highest paid unionized group in the airline industry and possibly the highest paid in any industry. In 1957, the average pay for the entire pilot and copilot group of Western Air Lines was \$13,763, including the company's contribution to the pilot pension fund. This

average pilot pay is more than 2½ times the average pay of all company employees.

Senior pilots with 20 years or more service were paid an average of \$18,046 during the past year, a figure raised to \$20,861 by inclusion of pension benefits. Pilots with 10 to 20 years experience (38 per cent of the group) were paid an average of \$15,590 in actual wages, or \$17,240 including company pension contributions. In addition, pilots received liberal expense allowance, paid vacations and paid sick leave. As of September 30, 1957, Western had the fifth highest average pilots pay of all domestic airlines.

Incidentally, it is reported that our pilots are receiving up to \$650 a month in strike pay.

The company offered an average 8 per cent increase in pay, plus a 12.5 per cent increase in expense allowances, during contract negotiations.

The union was willing to accept this pay proposal; however, it demanded other costly concessions from Western.

In doing so, the union followed the current, and amazing, line of reasoning that separates wages from a multitude of fringe benefits. The fact that each costs the company money seems to make little impression.

The major demands included: a demand for work not performed, in other words, credit for flight time for each period of duty regardless of whether the pilot actually flew an airplane; a demand for flight pay during training periods; a demand for a third pilot on the flight deck of the Lockheed Electra prop-jet aircraft which Western will operate in 1959 (this involves a jurisdictional dispute between the flight engineers union, with whom we have contract, and the pilots union); a demand for premium pay and benefits for pilots flying Western's new route between Los Angeles and Mexico City; and, a demand for a substantial increase in the company's contribution to the pilots special retirement fund.

If Western yielded to these featherbedding demands, we would be obliged to hire a great many new pilots in order to operate the same routes and the same schedules flown by our 263 pilots during 1957.

Note how closely the pattern of some of these demands fits the historical railroad pay practices. In the "Chicago Daily Tribune" of April 29, in an article entitled "Featherbed' Rules Swell Rails' Costs," the following appears:

"A 100-mile run is considered a day's work for passenger engineers and firemen, and 150 miles for passenger conductors and trainmen. Engine crews have a 5-hour work day, and conductors and trainmen a 7½ hour day.

"If the train goes more than 100 miles, the engineer gets 1 per cent of a day's pay for each extra mile. If a trip takes more than 5 hours, he gets overtime on an hourly basis. But if his run is less than 100 miles, or is finished in an hour, he still gets a day's pay. Conductors and trainmen are paid similarly on the basis of their mileage and hourly maximums.

"In freight service the whole crew is paid on the basis that either 100 miles or 8 hours constitutes a day's work. In addition, freight-engine crews are paid extra if their locomotive exceeds a certain weight, and freight conductors and brakemen if the train carries more than a certain number of cars.

"Railroad crews are on their own. Their bosses cannot look over their shoulders to see whether they are legitimately delayed or just loafing. The dual-payment rules were instituted originally to assure train crews that they would not suffer in hourly pay if they brought their trains in on time.

"Since then, both passenger and freight-train speeds have been increased greatly and have produced some absurd pay situations."

Unfortunately for all concerned, the same type of patchwork pay structure has been in part adopted by our industry and by the pilots' union in computing pilots' pay.

Each pilot receives base pay. For the first two years of service, he receives only base pay. Thereafter, he receives an additional amount known as flight pay. The amount of flight pay is computed on the number of hours he flies (with a premium for night flying), the number of miles he flies, the weight of the airplane, and the speed of the airplane.

The base pay is intended to compensate the pilot for non-flying duty, such as training and check-in time. Flight pay is designed to compensate him for productive flight duty.

A pilot is prohibited by law from flying more than 85 hours a month. The union has consistently sought to get flight pay for pilots for certain non-flying duty, and has been successful in some instances. The union also has succeeded, by contract, in having this artificial flight time charged against the 85 hours-a-month legal limit. As a result, the productivity of each pilot is materially limited. Because of these rules, Western's pilots in 1957 actually flew an average of only 81 hours per month.

With the advent of the turbo-jet and prop-jet aircraft this year, the pilots' union is now demanding even more gimmicks to enlarge the featherbedding piecemeal pay system and is bitterly opposing any sensible suggestion to simplify the system.

This sorry state of affairs cannot, of course, be charged alone to the pilots union. The airline managements must accept their share of responsibility. However, in my judgment, much of the trouble can be traced to that sad day in 1936 when the labor problems of the airlines were made subject to the Railway Labor Act.

Western and some of the other airlines have for several years felt that Congress should be urged to enact legislation removing the air carriers from the jurisdiction of the Railway Labor Act.

The Civil Aeronautics Act was adopted 20 years ago. As you know, it regulates our industry just as the Interstate Commerce Commission regulates the railroad industry. Before that law was passed, there was much pressure to put air transportation under the Interstate Commerce Commission. The Congress wisely withstood that pressure so that our industry could develop independent of stifling railroad precedents and regulatory restrictions of the Interstate Commerce Commission.

Subsequent to the adoption of the Civil Aeronautics Act, several railroads, and interests identified with railroads, have made attempts to engage in air transportation or to acquire

control of existing airlines. In each instance, the Civil Aeronautics Board has firmly refused to permit the railroads to enter or gain control over any segment of our industry, pointing out that the proper development of a sound air transport system requires that it be protected from railroad domination. With the exception of some of our railroad friends, most everyone agrees that this has been, and is, a sound policy.

Unfortunately, this policy was not followed when it came to consideration of airline labor disputes. These are administered by the National Mediation Board, under the provisions of the Railway Labor Act. Our labor matters are handled by the National Mediation Board on the same basis as are the labor issues of the railroads. In working on our labor problems, the National Mediation Board and its staff, several of whom are former railroad employees or officials, have, quite naturally, been greatly influenced by their railroad training, thinking and background. Sometimes members of the National Mediation Board and its staff will be working on a railroad labor case in the morning and an airline dispute in the afternoon, although by far the bulk of the board's work is with railroads.

It is not uncommon for mediation board people to propose to airline representatives, during mediating sessions, that a concession on a particular point should be made because that is the way a similar dispute was settled by the management of the "XYZ Railroad" in an argument with its engineers' union 15 years ago.

As a matter of fact, some of the people in the National Mediation Board are so saturated with railroad labor tradition that any suggested departure by representatives of our industry in proposing more modern and reasonable bases for computation of pay scales or working rules is summarily rejected.

This type of approach to our disagreements with union

officers, of course, is most welcome to some of the airline union officials who are interested in perpetuating all featherbedding practices. Obviously, these conflicts always strengthen the power of the union officials.

For a researcher, it would indeed be an interesting project to find out how very few cases there have been involving disputes between the airlines and the unions, ultimately settled by the National Mediation Board, in which the costs to the company were not materially increased over what had been offered during negotiation between the parties to the dispute before the help of the National Mediation Board was sought by the unions.

I am glad to report, however, that these views of some union leaders are not held by a very great percentage of airline employees, either union or non-union.

Most of these employees fully realize that their success and well-being are directly dependent upon the sound development, success and progress of the airline by which they are employed. As all thinking airline people know—and there is a considerably greater number of them than some of the union officers are aware—featherbeds will not fly. We will not prosper in the jet age, now beginning, unless we discard the obsolete "rules of the rails."

Lest you feel I am too pessimistic, may I quickly assure you that our industry has developed in spite of difficulties as serious as these. In the past, the airlines have overcome even greater obstacles. With a little firmness, we will no doubt solve this problem.

Air transportation is still in its early stages. You still rightly call it a growth industry. The next 20 years will produce expansion in our business greater than you have seen since 1938. Those of you who now recommend to your clients faith in the future of the airlines, and investment to back that faith, perform for those clients a real service.

RADIO CORPORATION OF AMERICA



Dividend Notice

The following dividends have been declared by the Board of Directors:

First Preferred Stock

87½ cents per share on the First Preferred Stock, for the period July 1, 1958 to September 30, 1958, payable October 1, 1958, to stockholders of record at the close of business September 8, 1958.

Common Stock

A quarterly dividend of 25 cents per share on the Common Stock, payable July 28, 1958, to stockholders of record at the close of business June 20, 1958.

ERNEST B. GORIN,
Vice President and Treasurer
New York, N. Y., June 6, 1958

Pullman Incorporated

— 387th Dividend —
92nd Consecutive Year of
Quarterly Cash Dividends

A regular quarterly dividend of seventy-five cents (75¢) per share will be paid on June 14, 1958, to stockholders of record June 2, 1958.

CHAMP CARRY
President



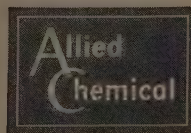
Allied Chemical CORPORATION

DIVIDEND

Quarterly dividend No. 149 of \$.75 per share has been declared on the Common Stock, payable June 10, 1958, to stockholders of record at the close of business May 16, 1958.

RICHARD F. HANSEN
Secretary

April 28, 1958



Continuous Cash Dividends Have Been
Paid Since Organization in 1920

Acoustical Ceilings By Celotex:

growth factor in a growth industry

Today, sound conditioning is a primary requirement in new construction . . . and is high on the list of current modernization projects for offices, schools, hospitals, stores, churches, restaurants, homes—wherever people work, congregate, live.

The Celotex Corporation continues its position of leadership in this industry—both in volume of sales and in the design of new products and new ceiling construction systems that integrate components for sound-, light- and air-conditioning.

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FOREST PRODUCTS INDUSTRY

Prospects for the Paper and Board Industry

D. O. BOWMAN

*Coordinator, Long-Range Planning
Crown Zellerbach Corporation*

THIS DISCUSSION IS NOT INTENDED to suggest that the paper and board industry is one from which spectacular fireworks should be expected. It is one where the growth opportunities are believed to be as great as or greater than in the past; where research and product development are present and growing; where there is every prospect that its products will continue to be relatively low in price, greater in volume, and distributed on a mass basis to reflect our rising living standards.

What growth rates have prevailed in the paper and board industry in the United States in recent decades, and how does this compare with the future growth prospects?

Over recent decades the consumption of paper and board in the United States has increased an average of about 5% annually compounded. This has varied some, depending upon economic conditions. The average rate of growth in the 'thirties and 'forties was less than in the 'twenties and 'fifties. In the last decade the per capita usage has increased about 40% and historically the consumption of the industry's products has grown more rapidly than has the general economy (if we measure the economy by the long-range growth of GNP—5% vs. 3%).

Another way of describing the growth is to say that each household in 1940 used almost 1,000 pounds of paper and board, and by 1957 each household used approximately 1,500 pounds of the industry's products. By 1975 each household will probably be approaching an annual use of a ton of paper and board products. Paper and board consumption is related closely to income levels and living standards, and as these are expected to continue to rise we may expect continuing growth in paper and board. Broadly speaking, the use of paper and board falls into three categories:

(1) Containers and packaging. Here we have a field that has shown rapid growth, so fast that some have referred to the "packaging revolution" of the past 25 years. Indeed, the consumption of container-board has increased at more than 5% annually for the last decade and may be expected to more than double in the next 20 years. The development of prepackaged foods is just nicely under way and will certainly expand greatly in the next decade, creating a demand for various types of paper and board, many

of which probably do not exist today. Food board may be expected to grow considerably faster than other boards because of the prepackaging developments.

(2) The second category of use is as a surface for writing and printing. Here we may anticipate continued growth because of the higher income levels, the probably higher educational and literacy standards, and the boom of school population, which we know is certain to develop even more than it has. Thus newsprint consumption levels face a bright future, as does the volume of printing papers and book papers.

(3) The third category of use is for cleanliness and sanitation purposes. The consumption of sanitary and tissue grades for toilet, facial, napkins, towels, and other sanitary uses has almost doubled since the end of World War II. There is the clear expectation that the growth of the economy will support continued growth of these grades and their consumption will probably double over the next 20 years.

In addition to these "conventional" uses for paper, there may well be rapid development of paper and board in such categories of use as construction, and as a substitute for textiles. There is no evidence of any persistent reduction in the rate of growth.

Ever since early in World War II industry experience with respect to operating ratios has been excellent. In all but four years from 1941 through 1957 the industry has operated at ratios of well over 90%; in two of the four years the ratio was over 89%; in one year it was 88%; and in one year it fell to 84%. For the ten years 1947-1956 the average ratio was 94.6%, as contrasted to the ten roaring years 1920-1929, when the average was 80.3%. In terms of this industry's historical experience, or indeed the experience of any other industry, this may be regarded as first-rate performance. In 1956 the industry produced 31,428,155 tons and pressed on capacity the entire year. The fall-off in demand against higher capacities in 1957 led to a production of 30,700,000 tons, or some 2.3% below 1956, with the operating ratio at almost 90%. For 1958, with still greater capacities and production approaching 1956 levels, the operating ratio over-all will probably average well below—say in the 85-87% range. But real restraint in adding to capacity has developed in the industry and

with some degree of recovery in the economy plus the trend growth of demand, the operating ratios in 1959 and 1960 may be expected to exceed those of 1958. By 1961 and into 1962 the expected demand should absorb all the capacity existing today plus additions that will need to be under way at that time.

Does it appear likely that the North American Continent will grow increasingly important as an exporter of pulp, paper, and board? If so, to where? Do we have the resources to enable us to compete effectively in world markets?

The development of the European common market has great commercial implications. The development will create an economic area with a current population of 162 million and a current gross national product in the range of 140 billion dollars. In terms of economic principles, this is far and away the correct course for western Europe, and we should expect one major economic result to be a growing GNP. Just what such a union will do tariff-wise against the United States will be a matter of negotiation, and it is one in which all of us should be deeply interested. But, in any case, in time the higher economic levels that are in prospect will redound to the benefit of the United States. By any view, growing prosperity in Europe is good for the United States, both economically and politically. The kind of exports the United States now sends to Europe may be expected to increase because of the higher prosperity there, and the products we now have difficulty marketing in Europe may find a more receptive area because of the higher economic levels. Some American firms are already establishing joint ventures in Europe and some of these are in the paper industry. It may well develop that the common market group may establish external barriers while reducing internal barriers, and that North American paper may have difficulty moving in volume into that market. But the anticipated higher levels of economic activity suggest that, even if there are barriers in the early years, pulp or paper, or both, may reasonably be expected to move to Europe in the years ahead because of the North American advantages in mass production and cellulose resources in one of its most economic forms, namely timber.

OPPORTUNITIES IN LATIN AMERICA

Another area that offers possibilities is Latin America. There the population will probably increase by 50% in the next two decades, and will then exceed ours. The growing industrial development, as well as slowly rising living standards that one may hope for, will require increased tonnages of paper and board. Hardwood forests abound in Latin America, but such wood is not well suited for many grades of paper, notably those that use soft woods as the furnish—and Latin America is very short of accessible and economic soft wood. Latin America does have other cellulose resources, such as bagasse, but here there are economic and quality problems to be solved. Thus the Latin America area offers a growing market prospect for pulps, paper, and to some lesser extent, board, although the problem of population in relation to resources may prevent a rapid expansion of this market. This prospect must al-

ways be tempered, of course, by the current convertibility problem and the balance-of-payments problem that beset most of today's growing economies.

There has already been a significant development in the world economy of pulp and paper. Until the beginning of World War II, both the United States and North America were net importers of pulp. Although Canada was a net exporter, she could not offset our larger imports. From 1940 through 1944 both the United States and North America were net exporters and both returned to a net importer position 1945 through 1950. Beginning in 1951 and thereafter (except for 1953) North America has been a net exporter of pulp. Beginning in 1954, the United States became a net exporter of pulp and has remained so through 1957. This suggests a basic change, namely, that the mass producing, high-speed facilities of the United States and Canada, backed up by great, accessible, varied, and economic timber resources have put the United States and Canada in a favorable position to compete effectively in world markets. Although Europe and Latin America appear to be the best prospective markets, to some extent Africa and the Middle East represent possible market areas for development.

What major developments in the technology of the industry are now occurring, or in prospect, and how are they likely to affect the economics of the industry?

The elemental process of papermaking is centuries old, but the science of cellulose and other wood chemicals is still developing. And although the basic processes appear to be well established, they are undergoing change that simplifies, improves, and brings economies. This may begin in the woods with such developments as chemical debarking, or chipping plants located in the woods, or efforts to grow trees more rapidly; and extend to the development of new final products such as fire-resistant kraft paper treated with aluminum and used to make firemen's protective clothing. Some of the more interesting current developments are these:

(a) Continuous digesters. These are for cooking pulps, using the principle of automatic and continuous feed as compared with the batch process that has been and is now the standard process. The economic advantages consist of a saving in steam, a saving in manpower, and more uniform pulps.

(b) Extensible papers, of the type developed recently within the industry. The papers are made by a process whereby stretch in machine direction of 10% or more can be imparted to the paper and 5% or more stretch in cross direction. This compares with stretch in conventional papers of 1.5-2.5% (machine) and 3-5% (cross). It may be that a wide range of uses will be developed for such papers.

(c) High-yield pulps. Essentially these pulps are for use in various types of board, and by high-yield we mean the conversion of 60-90% of the wood into pulp, against 45-50% of wood into pulp when used for paper. The process consists of softening and partially cooking wood chips and then reducing them to a coarse fiber by mechan-

ical means. In this process it is preferable to use hardwoods, hence great economic advantages accrue in the South, the Lake States, and the Northeast, where hardwoods are in ample supply and often grow intermingled with the desirable soft wood species. The effect is not only short-run economies but also a long-run extension of our wood supply.

(d) Pelletized pulp and bulk pulp shipping. These two developments may modify the practice of locating paper mills near wood resources. Pulp can often be shipped in bulk at a lower cost than paper, in which case there are savings available, in addition to providing greater service potential available for the consumers. A very recent development, still in the experimental stage, suggests that it may be economically feasible to pelletize pulp so that it is free-flowing in pellet form and greatly extend flexibility in handling. This, if the economics work out, would bring changes in pulp handling practices and in the movement of pulp.

(e) Superbleaching. The enormous expansion of packaging, including prepackaging of food, has led to the development of whiter packaging papers and board. The high bleaches possible by the application of chlorine and hypochlorite have now been extended by superbleaching through the use of chlorine dioxide. This enables the production of whites previously unattainable and will lead to new products and new uses.

(f) Coating developments. Many papers have had a coating of mineral substances, such as clay, for many years, for decorative reasons and to permit improved printing. The industry is now developing double coating which will permit still more improvement in printing. Such coating will be done on the paper machine as part of the primary process, hence should be quite economical. This means an upgraded product all along the line. Another coating development is the vacuum metallizing of paper, to produce a new and unique product.

(g) Silvichemical developments. This used to be called the "use of by-products" or "waste products" and arises from the fact that historically the industry used only about 30% of the log and discarded the rest or used it for fuel or chemical recovery. There is now a range of products from the waste liquors of the industry, the sale of which last year has been estimated by some at \$38 million at the point of production. Further, it is believed that upwards of 1,000 technically trained people are now at work in the development of Silvichemicals. The products include:

- (1) Various lignosulfonates used by other industries as dispersing agents, adhesive extenders, and dust palliatives
- (2) Grain alcohol
- (3) Vanillin
- (4) Dimethyl Sulfide
- (5) Tall oil and turpentine.

More products are gradually emerging, and the significant point here is the prospect for growth of such products, both in number and quantities. It is at this point that the paper and board industry has a close relationship to, if indeed it does not lap over into, the chemicals group.

(h) Finally, the industry is continuing to introduce more automatic processes, as well as to introduce automation wherever possible. This often means better quality of product, in addition to more rapid production.

The growth of an industry is often regarded as closely related to the money spent on research and development. What is the situation with respect to research in the paper and board industry?

This industry is research-and-development-minded and it spends money accordingly. Let us analyze this further.

First, keep in mind that throughout most of the years since 1940 the industry's major problem has been to expand production to meet demand, hence its research has been heavily, though not entirely, pointed in the direction of equipment, supplies, and materials. In this period, for example, machine speeds have increased tremendously by reason of better pulps, machine improvements, better drives, etc. This has meant increased productivity for the industry and has enabled the industry to expand its market through volume operation and the sale of low-price products. Such increased productivity is not confined to mills but actually begins with the logging operations.

Second, in 1954, according to the National Science Foundation, this industry spent directly about \$32 million on research and development. For 1957, that figure will be up 20% over 1954, or the industry probably spent about \$38 million. This does not include money spent in lumber, plywood, or related fields. This is a respectable sum when it is considered that most of the money is spent by a relatively few firms in the industry. Consider further that virtually all the money spent on research and development by this industry comes from the industry itself, whereas—except for the chemicals industries group and even they may to some extent—virtually all those industries with huge R & D budgets these days are enabled to spend such sums because of national defense expenditures.

Third, the tremendous sums spent by the chemicals industry, with which the paper and board industry is often compared, are required to be spent because chemical companies are essentially in the business of creating technological revolutions and scientific breakthroughs. Much of the research that is done by chemical companies is because the paper and board industry is a handsome customer; hence if one renders judgment on the adequacy of research expenditures by considering only this industry's direct expenditures, one may miss a very important contribution made by others. In fact, a number of chemical companies have experimental paper machines for testing the effects and extending the uses of chemicals in paper and board production. This same point is applicable to various other industries, such as some of the machinery and allied products group.

Fourth, this is one of the very few industries which supports its own industry research labs. I refer to the Institute of Paper Chemistry at Appleton, Wisconsin, which has turned out more than 150 Ph.D.'s for the technical side of the industry and which conducts research as well. In addition, the Forest Products Laboratory at Madison, Wisconsin, is supported by the Forest Service but a great

part of its effort is for the benefit of this industry. Likewise the various Federal and state experiment stations and research programs assist in our research and development.

Fifth, it should be remembered that much research and development in fact occurs in the course of daily operations because of the inherent flexibility that characterizes the Fourdrinier machine. The Fourdrinier can often turn out a "new product" designed to meet a need simply, for example, by a good papermaker varying the furnish, the stock and its refining, the speed, or the drying and finishing, and the effect is the same as that which occurs in some industries only after prolonged trial-and-error and the expenditure of large sums for equipment and pilot operations.

Finally, many people in the industry feel that there must be major step-ups in research and development expenditures. They may feel that competition from plastics requires this. Or they believe that there are some grades where lighter basis weights may be desirable. Perhaps the problem of making trees grow more rapidly will attain more significance in research than heretofore. They are all desirable. But to do this requires technically qualified people and here there appears to be a scarcity of people who desire to enter the research field in American industry. Even when we get the right people there is a problem as to how fast they can be digested in organizations. But research is growing. Already there is much joint research, both by companies within this industry and between companies within this industry and other industries, and this may be expected to develop further. On the whole, the past record is that the industry had ample research and development in support of its growth and the prospect is that it will have even greater support in the future.

Has the competition from the growth of various plastics been injurious to the industry, and how is the industry meeting such competition?

This is a field where development has come, and is continuing, at a tremendous pace. Take polyethylene. The first polyethylene unit was built, I believe, in 1942. By 1948 production amounted to 20 million pounds. By 1955 production reached 200 million pounds; and capacity today is at least five times that. Polypropylene, similar to poly-

ethylene but perhaps even more versatile, is just entering the competition. There is also the competitor, cellophane, made from wood cellulose, as well as a number of other competitive products. This, I suggest, is to the ultimate advantage of the paper and board industry. Here is why:

First, the so-called "plastics" satisfy many needs that paper has never attempted to satisfy and in doing this they really expand the number of products to be made with paper, since we already are learning how to work with these plastics and often a paper-plastics combination satisfies a need that either alone could not. More adaptability and versatility in the use of materials, which plastics make possible, are to our own advantage in expanding our markets.

Second, while it is true that plastics have led in a number of cases to close competition between plastics and paper to satisfy a particular consumer want, such competition stimulates us to develop products that will substitute for other materials, and often the plastics help us do this. Thus we compete with such materials as textiles, steel, and wood, sometimes in combination with plastics.

Third, as new materials come along they cause us to scrutinize our raw materials and our Silvichemicals to make certain that we are doing the right thing with our resources. Several "plastics" come from wood and we always have alternatives before us for the most effective use of our resources. It may well be that in time some members of the industry, particularly those with wood resources, may find themselves more interested in producing plastics and Silvichemicals than in producing paper, and many of these developments bring us closer to that possibility.

And, finally, we are stimulated and forced to address ourselves to the economics of our industry because of the competition of plastics. This may well be the most important result we can have. Thus far we have done very well on this score and with our research programs we should give some plastics—the more bothersome ones—a real run for their money. We have a history of continually expanding our markets by producing and distributing our products on a mass basis at a price that assures growing use by individuals and households. This may be expected to continue.

AIR REDUCTION

Company Incorporated



164th CONSECUTIVE

COMMON STOCK DIVIDEND

The Board of Directors has declared a regular quarterly dividend of 62½¢ per share on the Common Stock of the Company, payable on June 5, 1958 to holders of record on May 16, 1958, and the twenty-sixth regular quarterly dividend of \$1.125 per share on the 4.50% Cumulative Preferred Stock, 1951 Series, of the Company, payable on June 5, 1958 to holders of record on May 16, 1958.

April 23, 1958

T. S. O'BRIEN, Secretary

Harbison-Walker Refractories Company

Board of Directors has declared for quarter ending June 30, 1958, DIVIDEND OF ONE AND ONE-HALF (1½%) PER CENT or \$1.50 per share on PREFERRED STOCK, payable July 21, 1958, to shareholders of record July 7, 1958.

Also declared a DIVIDEND of \$.45 per share on COMMON STOCK, payable June 2, 1958, to shareholders of record May 12, 1958.

G. F. Cronmiller, Jr.
Vice President and Secretary

Pittsburgh, April 24, 1958.



THE DAYTON POWER AND LIGHT COMPANY

DAYTON, OHIO

143rd Common Dividend

The Board of Directors has declared a regular quarterly dividend of 60¢ per share on the Common Stock of the Company, payable on June 2, 1958 to stockholders of record at the close of business on May 14, 1958.

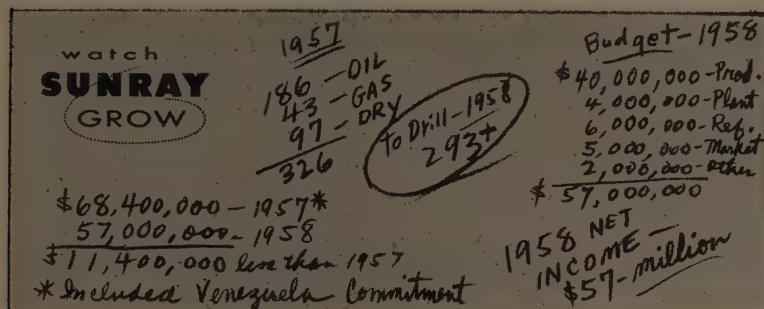
GEORGE SELLERS, Secretary
May 2, 1958

Drilling for Oil with a Budget

NOT MANY YEARS AGO an oil producing company would drill a well whenever it had the money and a lease. Sometimes the well came in with a good showing of oil. Other times the well might produce gas. Very often the well was dry.

LUCK WAS THE LADY drillers depended upon to bring them the favor of oil. Luck was good to many. An individual driller, with a few good wells and no dry holes prospered quickly. Soon a growing company would emerge from his drilling effort, with many individuals finding themselves with good employment. Many thousands of others became stockholders to share in this business of service and progress.

TO THOUSANDS OF OTHERS Lady Luck was a myth. After too many dry holes quite a few oil men were broke, and many a budding oil company closed its doors.



TODAY drilling for oil is much more scientific. There are many methods of surveying the land for possible oil or gas. Certainly, many dry holes are still drilled every year, but percentages are improving, especially in proven and semi-proven areas.

SUNRAY MID-CONTINENT maintains a large geological department. The company uses independent survey companies to plot leases before rigs are set up. The company also budgets money to be used for drilling at the start of each year. There is no hit or miss spending which might weaken the financial stability of the company. Forecasts, which have always proved to be very reliable, are made to determine the amount of production expected during each twelve months.

THIS YEAR Sunray set up an exploration and production budget for 1958 of approximately \$46,000,000. For this money the company expects to get about 300 drilling completions, some oil, some gas and some dry holes. With this planned program Sunray is on safe ground and should end the year with the amount of new oil and gas production expected.

D-X is the brand name of quality products manufactured by D-X Sunray Oil Company, a wholly-owned subsidiary

PRODUCERS
REFINERS
MARKETERS



SUNRAY MID-CONTINENT
Oil Company

GENERAL OFFICES - SUNRAY BUILDING - TULSA, OKLAHOMA

IBM

173RD CONSECUTIVE
QUARTERLY DIVIDEND

The Board of Directors of International Business Machines Corporation has today declared a quarterly cash dividend of \$.65 per share, payable June 10, 1958, to stockholders of record at the close of business on May 12, 1958.

C. V. BOULTON,
Treasurer

590 Madison Avenue
New York 22, N. Y.
April 29, 1958

IBM

INTERNATIONAL
BUSINESS MACHINES
CORPORATION



TEXAS EASTERN

DIVIDEND NOTICE

MAY 7, 1958

The Board of Directors of the Company has declared the following quarterly dividends, all payable on June 1, 1958, to stockholders of record at the close of business May 15, 1958.

COMMON STOCK	\$0.35
PREFERRED STOCK	
5.50% First Preferred Series.....	\$1.37½
5.85% Series	\$1.46¼
5.00% Series	\$1.25
4.75% Convertible Series.....	\$1.18¾
4.50% Convertible Series.....	\$1.12½
5.75% Subordinate Convertible Series....	\$1.43¾
6.70% Series	\$1.67½

W. J. Hargrave
Secretary

TEXAS EASTERN
 Transmission  Corporation
 SHREVEPORT LOUISIANA

NATURAL GAS: Processing and Transmission
 OIL AND GAS: Exploration and Production
 OIL PRODUCTS: Refining and Transmission

ELECTRONIC COMPONENTS

Introduction to the Components Industry

PHILLIP W. ZONNE

Chairman, American Electronics, Inc.

THE ELECTRONIC COMPONENTS INDUSTRY covers a very diversified and long list of products, many of which encroach on the electronics systems business. To mention a long list of electronic components is cumbersome, and to distinguish between electronic components and systems requires individual judgment. Fully realizing, thus, that the clarification of the term, electronic component, is highly subjective, it is felt that it is important at this convention of financial analysts to start a discussion with a definition of the term.

DEFINITION OF ELECTRONIC COMPONENTS

Surely quick agreement can be reached that a transistor, or an electronic tube, or a diode is a component of the electronic industry. But, what about A.C. or D.C. miniature electric motors? Are they electronic components? Or what about a multi-channel magnetic tape recorder which in itself is a complex electronics system, but which can be used as a part of the telemetering of missiles? Is a magnetic tape recorder a component? And then, there is the small "black box," the relatively simple sub-system, such as a transducer. It is an electronic system, it is true, but a fairly simple one. Are the little "black boxes" components? It is easy to get lost in defining electronic components, but if we decide that any manufactured entity that can be sold to a portion, or all of the electronics industry, is an electronic component, then the definition becomes simpler. Thus, for the purpose of this talk, when a manufacturer produces hardware that is used in a number of different electronic systems in the electronic industry, or when that manufacturer produces an item that can be utilized widely in the electronic industry, then these specific products are all electronic components. Under such a definition, an A.C. or D.C. miniature motor, a magnetic tape recorder, and a "black box" sub-system is each an electronic component.

Having defined the term, electronic component, we are ready to treat the main thought that should be of interest to all financial analysts. Are the electronic component manufacturers here to stay, or are they becoming a part of the larger systems manufacturers?

ARE THE ELECTRONIC COMPONENTS MANUFACTURERS HERE TO STAY

(1) *Size*

In today's economy, size is important even to the com-

ponent manufacturer. The era of the garage operation is over. Reliability of product performance alone mandates considerable investment in test equipment which in turn requires a suitable environment. Customers are turning away from the very small unreliable sources. So, size has become increasingly important. The component manufacturer must have, beyond his basic engineering competence, a good facility with sufficient test equipment; he must be adequately financed, and he must in general have a well rounded operation which automatically eliminates a tiny "boot strap" enterprise. Thus, for an electronic components business to continue into the future, it must have some stature now, but this does not mean it should be a larger operation.

(2) *"State of Flux" of the Electronic and Airframe Industry*

The electronic and airframe industry is in a constant state of flux which affects all subcontractors to these industries. Components are in a continual process of technological upgrading. Thus, whereas "garage" operations are currently eliminated, we find that very large components manufacturers are structurally too lethargic. Large centralized organizations tend to have too much inertia that resists change. Hence, the successful electronic components manufacturers tend to be from a small to medium size business that is highly specialized to cope with the state of flux.

(3) *Management*

To manage any business in a constant process of change requires a special type of management. First of all the management must be dedicated to its cause. Then, such a management must necessarily be a fairly young group that is willing to continually "run," and be healthy enough to absorb a relatively high degree of constant punishment. Such a management flowers best in a smaller business, or in a really decentralized large business. The management personalities needed in the smaller electronic components business tend to migrate away from larger corporate organizational structures, and, hence, it is felt that this type of management requirement will tend to perpetuate to components manufacturers.

(4) *Special Marketing Problems*

For the moment, let us presume that a large electronic systems business decides to manufacture its own components. If this company does not attempt to sell its compon-

ents to the entire electronics industry it has only its own limited market, and since its volume will, thus, be down, the cost of manufacturing the components will be higher than a manufacturer specializing in the product. In attempting to sell a particular component to another large electronic systems manufacturer, it is very often likely that this systems customer is actually a competitor. Such a position will not sponsor the sale of the product. Finally, if the presumed electronic system manufacturer attempts to sell its line of components through its regular sales department, it will find that the salesmen and the sales management will tend to emphasize the sales of large dollar systems business and neglect the relatively small dollar sales of components. There are numerous examples of large systems manufacturers giving up on the attempt to produce components that were the by products of their research departments. With few, if any, exceptions, the only large systems manufacturers that are producing components profitably are those businesses that started as components manufacturers and gradually broadened their components base to a larger system business. In these cases, the components are produced in autonomous divisions that are decentralized from the large parent, and as such are really separate components businesses.

(5) Profit Margins

In general the highly specialized, smaller electronic components industries are less competitive than their larger systems customers. For this reason, the percentage of prof-

its on sales is higher. A cautionary thought should be noted at this point, however, in that the profit return as a percentage of invested capital is no better than, and may not be as good as, the electronic systems business. Because capitalization is relatively high it helps to keep competition nominal, thus, providing the higher percentage profits on sales.

(6) Stability

Because of the widespread customer requirements for components, this section of the electronics industry is less susceptible to the potential abrupt discontinuity of large systems businesses. For this reason it is a more stable type of business. Technologically there are insufficient numbers of engineers and scientific management to meet the demand for an ever increasing number of components. Where competence exists in the electronic components field, it is a stable, long term endeavor.

CONCLUSION

For reasons of size, state of flux, management, special marketing problems, profit margins, and stability, it is felt that the electronic components industry is here to stay.

If a diversified group of electronic components and subsystems businesses were to be consolidated under a corporate heading, then all of the advantages of a components business could be realized in aggregate which could in such decentralized form become a large corporation. This is the philosophy behind the growth of American Electronics, Inc.

World's biggest road building program under way— Blaw-Knox helps turn it into a production line



HIGHWAYS FROM A HOPPER. Up to 1800 batches of paving-concrete mix a day... and every batch automatically accurate down to a fraction of a percent! That's the output of this Blaw-Knox batching plant, at work on the North Illinois Toll Highway.

Road builders are tackling the world's biggest construction project . . . 41,000 miles of superhighways with added thousands of miles of state and local roads. It will carry one-fifth of the nation's traffic, enable motorists to travel coast-to-coast without passing a single intersection.

Here too, Blaw-Knox pioneers with integrated high capacity equipment to bring production line techniques to road paving. The future looks smooth for highway travel and for Blaw-Knox, one of the world's leading makers of road paving equipment.

Building a vast highway system is a typical instance of Blaw-Knox helping industry to tackle the biggest, toughest jobs. Perhaps we can help you tackle the tough ones. Whether your company builds roads, rolls or fabricates metals . . . or deals with chemicals, processing, or communications—our services and products for industry may provide precisely what you need. To find out more about us, just write for our brochure, "This Is Blaw-Knox."

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Beneficial Finance System

Opens its

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The new Beneficial office at Paramus, N. J.—a nearby suburb of New York—is the 1100th unit in what has long been the world's largest system of finance offices.

Located in the busy Garden State Plaza Shopping Center, the Paramus office demonstrates an established Beneficial policy: to make its friendly, realistic assistance conveniently accessible to as many families as possible.

Because Beneficial's service is geared specially to family requirements, it has shown a noteworthy vitality over the 44 years of its history, a period encompassing all phases of the economic cycle—boom, recession, war and peace.

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1100 OFFICES IN THE UNITED STATES, CANADA, HAWAII AND ALASKA

BANKING AND CREDIT

Outlook for Bank Earnings

CLIFFORD TWETER

Executive Vice President, California Bank

IT IS A PLEASURE to be here this morning to talk about my favorite subject, banking, but today we are isolating one segment of banking for discussion, "Outlook for Bank Earnings." In view of developments since the first of the year, with the substantial easing in the money market and decline in business activity, the earnings outlook is receiving more than passing attention by everyone in the industry. Today I should like to talk about the earnings outlook for 1958 as well as make some observations on the long-range viewpoint.

Outlook for bank earnings is indeed a broad subject. In a way it conveys the impression that it is possible to measure certain known factors and to come up with an answer that can be applied to banks generally. Is it possible to generalize on a subject such as this from a long-range standpoint? Is the growth potential and the earnings outlook the same for all banks?

THE VARIOUS TYPES OF BANKS

To develop this thought a bit further, there are various types of banks. We have the truly wholesale bank, the bank looking solely to business from large corporations and having no interest in retail banking activities such as consumer and real estate loans. Then we have the combination wholesale and retail banks. These include unit banks restricted to one location, others with limited branch banking authority, and a third group having broad state-wide branching authority. Is it reasonable to assume the outlook for each of these groups of banks is relatively the same? Earnings of wholesale banks are particularly sensitive to changes in the prime interest rate, as these banks have a substantial percentage of loans at or near the prime rate. Earnings of the combination wholesale-retail banks are less affected as retail interest rates are not subject to the same degree of change as the prime rate. Therefore the extent to which retail banking may influence total earnings of a bank requires close analysis.

Growth potential is another factor which has a bearing on earnings, particularly from a long-range standpoint. Deposit trends for member banks of the Federal Reserve System reveal that growth has not been uniform throughout the nation. In the five-year period ended December 31,

1956, deposit growth by selected Federal Reserve Districts was as follows:

Boston	15%
New York	18
Philadelphia	21
Chicago	22
San Francisco	31
Atlanta	39

While the rate of growth has not been uniform, the statistical record does prove that banking is a growth industry. Therefore let us look at some of these statistics. A recent study completed under the direction of Jules I. Bogen at the Graduate School of Business Administration, New York University, provided some interesting comparisons on the growth of banking. The study points out that gross earnings of banks have kept pace fully with the growth of the economy over the past twenty years. Whereas the gross national product increased by 457% between 1937 and 1956, gross operating earnings of insured banks rose by 443% over the same period. Further evidence that gross operating earnings of insured commercial banks have conformed to a growth industry pattern is shown by a comparison with gross revenues of other growth industries such as automobile manufacturing, the telephone industry and electric utilities. Using 1937 as the base year in each instance, gross revenues of the automobile industry (factory sales) increased by 435% in the twenty years ended in 1956; the telephone industry by 548%; and electric utilities by 370%. Again, in this same period, gross operating earnings of insured banks rose by 443%.

This is general, just as it was designed to be. It does, however, emphasize the growth characteristics of the banking business. The Economic Policy Commission of the American Bankers Association recently published a special report on bank earnings entitled "A Challenge for Management." This report points up the strategic areas in which decisions by bankers will vitally affect the future earnings of their institutions. I was particularly interested in certain figures which seemed to confirm that the banking industry had achieved and maintained a reasonable balance between earnings and expenses over the 1946-1956 period. For ex-

ample, while salary, interest and other operating expenses increased \$2.7 billions in the ten years, gross operating earnings increased \$4.3 billions. While the rate of increase in each instance was an identical 153%, the banking industry did demonstrate its ability to cope with the problem of increased operating expenses and to maintain the stability of earnings with which you gentlemen are acquainted. Therefore the question is, Can this trend continue? I believe so.

If we have confidence in the future growth of our country and project a gross national product growth factor of 2% a year, or 3%, or any other reasonable percentage factor, we should witness a growth in gross national product to well over \$500 billion over the next ten years. The exact figure is unimportant for our purpose today. Such growth must certainly be accompanied by continued growth in the banking industry. Therefore, you can see that my long-term outlook for banking is on the optimistic side. There will be changes in banking, to be sure, but not to the extent we may find in some other industries. Antibiotics manufactured by one company today may be replaced by improved drugs manufactured by another tomorrow. The missiles manufactured today may be replaced by other weapons. Technological changes undoubtedly will affect many industries over the next ten years, but money, I am sure, will continue to serve as the basis of exchange.

Now to look at earnings on a more current basis—the outlook for 1958. We can pursue this subject with a greater degree of certainty. A number of banks published first quarter earnings figures. In general, the reports were very good, most banks reporting increased earnings as compared with the same period a year ago. This was to be expected. The higher interest rates prevailing in the latter part of 1957 carried over into 1958, and the prime rate cut from 4½% to 4% had not fully taken effect. Since then, however, with the Federal Reserve Board providing a further easing in the money market through reductions in both the rediscount rate and reserve requirements, another cut in the prime rate became inevitable, this time from 4% to 3½%.

The reduction in interest rates has been accompanied by some slackening in demand for commercial and industrial loans. For example, commercial and industrial loans of all reporting member banks of the Federal Reserve System at April 30, 1958, totaled \$29.713 billions, a reduction of \$79 million from the preceding week end and \$1.317 billions from the total a year earlier. However, barring a further slackening in business activity, it seems reasonable to expect that loan volume may continue at about present levels or perhaps at slightly lower levels over the near future and quite possibly will trend upwards in the fall months due to seasonal demand. If this should be the pattern, it appears that loan volume may continue at reasonably satisfactory levels throughout the year.

Our primary concern, then, is the effect reduced interest rates may have on earnings in 1958. Again, the impact of reduced rates will not be the same for all banks, the degree of impact depending upon the percentage of loans made

at or near the prime rate. However, it seems reasonable to project that income from commercial loans will be somewhat less in 1958 as compared with 1957. The decline probably may not be too great and conceivably may be offset in part through other means.

Another important source of income is from investments—Government obligations. While interest rates on Governments have dropped sharply, this should not necessarily have a material effect on earnings from the investment account in 1958 unless, of course, a bank has unusually heavy maturities to be reinvested at current levels. In general, most bond accounts have maturities spread over a period of years and therefore only the maturing issues for reinvestment should have an effect on bond income.

There are other plus factors which should be mentioned.

1. The reduction in reserve requirements by the Federal Reserve Board frees up approximately \$450 million in funds which become available for investment in earnings assets. For any one bank this may not be too significant, but it is a factor.

2. There appears to be a reasonable possibility that savings rate may be reduced in some areas prior to the next interest period beginning July 1st. This is an important item of expense with some banks—some banks, of course, have practically no savings business.

Many banks are now paying 3%, the legal maximum, and a reduction of ½% would represent an important savings.

3. Personnel turnover is much less of a problem today, which opens up avenues whereby salary expense may be controlled to a greater degree than has been possible in recent years.

Now we have talked about the principal sources of income and some of the major expense items. This would seem to be an appropriate point at which to summarize the things we have covered today and draw some conclusions.

From the long-range viewpoint, we tried to establish:

1. Banking is a growth industry.
2. If earnings can be associated with growth, then the long-term outlook is promising.
3. Growth potential is not the same for all banks.

From the standpoint of 1958, we tried to establish:

1. That the easing of the money market does not influence all earning assets to the same degree.
2. Expenses are getting under better control.
3. A reduction in savings rate could be an influencing factor of consequence in earnings of those banks that have a substantial amount of savings business.

On balance it would appear that bank earnings for 1958 look promising even though they may be less than in 1957. When measured against the current earnings reports of other industries, it can be said that bank earnings are holding up exceedingly well.

Finance Companies in Today's Economy

ELLIOTT TAYLOR

Vice President, Pacific Finance Corporation

IT SEEMS TO ME that the appropriate starting point for our discussion of "Finance Companies in Today's Economy" is to identify for you the specific fields of business activity in which finance companies are engaged. The term "finance company" can be a little ambiguous and often means different things to different people outside the industry.

In the broad category of consumer credit there are two basic classifications: instalment credit and non-instalment credit.

Non-instalment credit amounted to \$10.7 billion at the end of 1957 and includes single payment loans, charge accounts and service credit. Finance companies are not generally involved in this segment of consumer credit.

Instalment credit amounted to \$34.1 billion at the end of last year. This includes automobile paper, other consumer goods paper, repair and modernization loans and personal cash loans. This is the area in which finance companies do business.

BACKGROUND OF INSTALMENT CREDIT

Historically, consumer instalment credit dates back to the beginning of mass production in the automobile industry. This is not just a coincidence. Without instalment credit, there could have been no mass distribution of automobiles—and, it goes without saying, no mass production.

Back in the early 1920's, total instalment receivables were about \$1 billion. Today, they are more than thirty times that amount. Over that span of time, growth has been at an average annual rate of 10 per cent. In the past seven or eight years, it has grown at more than this average rate.

This growth story is really the growth story of the finance industry. We are not, of course, the only financial institutions in the field of instalment credit. We did, however, do the pioneering job:

Finance companies were the first to see the need for instalment credit,

Finance companies were the first to recognize its sound earnings potential, and

Finance companies took the initial risks.

As the business became more specialized, two types of finance companies evolved:

Sales finance companies which finance the instalment purchase of durable goods, such as automobiles and household appliances.

Consumer finance companies which make direct cash loans to consumers.

Many of these companies perform both functions.

As it emerged out of the pioneering phase, the stability and the potential of the business became generally recognized. Other financial institutions entered the field. Today,

finance companies share the market with commercial banks, retail outlets, credit unions, industrial loan companies and savings and loan associations.

Now let us look at how total instalment receivables are distributed among the various financial institutions. We now have some relative newcomers in the field who provide not only good company but also pretty substantial competition. Consider, for example, the strong position which our banker friends have attained, with 37 per cent of the total.

But consider, too, the rate at which the entire market has grown just since 1950. Receivables have climbed from \$14.7 billion to \$34.1 billion. In the face of that growth, and of the future growth which we anticipate, the finance industry is not uncomfortable about sharing the market.

Banks have a specialized type of service to offer to a specific group of customers. And so do the other institutions. Because of convenience, because of habit, because of appeal to special types of borrowers, each of these institutions will continue to receive its share of the market.

The same can be said for finance companies. Traditionally, we have held a sizeable share—in fact, we still have the largest share of the market with 38 per cent. This is the result of tailoring our services to reach the broadest cross-section of the consumer public and, for this reason, we hope and expect to continue to lead in the field of instalment credit.

STABILITY OF THE FINANCE INDUSTRY

So much for background. Now I would like to talk about some of the factors which contribute to the stability of the finance industry.

One of the prime stabilizing factors we have already referred to . . . the persistent growth of instalment credit. More importantly, that growth has, over the long pull, been in sound relationship to our growing economy. While consumer debt of all types has grown, the consumer's net worth has also been increasing at an astonishing rate.

The FRB study of last year shows that, while the consumer's liabilities increased from \$25 billion to \$127 billion between 1939 and 1955, his total assets rose from \$269 billion to \$970 billion, and his net worth increased from \$244 billion to \$843 billion.

Our industry derives additional stability from the very fact that it is making an essential contribution to our national standard of living. The role of the automobile in American life is one I need not elaborate on for this audience. But you might give some thought to the many other facets of contemporary American living which are directly or indirectly linked to instalment credit, such as:

- home ownership
- suburban living
- early marriages and early family formation
- freedom from household drudgery

- more diversified recreational opportunity, and
- greater availability of higher education.

The long-term significance of instalment credit was aptly summarized in a quote from last year's Federal Reserve Board report:

"... the growth of instalment credit has been an integral part in the development of the United States economy in the 20th century.

"The existence of instalment credit facilities, called forth by the need to finance automobiles and other expensive durable goods, influenced attitudes toward borrowing and also led to the use of instalment credit for the financing of other goods and services. In turn, new types of credit facilities have been established.

"Use of instalment credit has thus become deeply embedded among the habits and customs of American consumers and businessmen."

So far, we have reviewed the stability of our industry in terms of growth and function. Now to gauge its stability in terms of market, let us try to describe our average customer:

He is a young man with a wife and two youngsters.

He has a good job which could be in almost any of the occupational classifications; he is highly employable and has a better than average chance of getting ahead.

He is not in the extremely low or extremely high income groups; he is probably in the \$4,000-\$7,500 income bracket.

He has increasing liquid assets.

His immediate needs include a car (or a better car) and a well-equipped home.

In short, he is an extraordinarily stable citizen, this typical customer of ours.

Another type of stability is the considerable diversification of our industry. In fact, we really have several types of diversification.

Perhaps the first of these diversifications is in connection with sources of funds.

Our borrowed funds—and, like other financial institutions, we operate on a relatively high proportion of borrowed money—are not dependent on just one source, but many: long-term debt (senior and subordinated notes and debentures) and short-term debt (bank borrowings, and commercial paper).

Incidentally, the ratio of borrowings to total capital structure varies, depending on the type of receivables. For example, in consumer finance companies, the receivables represent direct cash loans which are, to a large extent, unsecured. For such companies, about 70 to 75 per cent of the total capital structure is made up of borrowed funds.

Most of the receivables of sales finance companies, on the other hand, are represented by retail instalment sales contracts secured by liens on automobiles and other durable goods. Also, many of these contracts carry the guarantee or repurchase agreement of the selling dealer. With receivables of this type, sales finance companies operate with a borrowed-fund ratio of around 85 per cent.

The high leverage in this type of capital structure places our industry in a very favorable position.

Another type of diversification is that of services. Most of the finance companies in the country provide diversified services.

Many of them offer both sales finance and consumer finance services.

Some of them offer specialized services, such as travel credit and merchandise credit.

Many of them have insurance subsidiaries which are, in turn, broadly diversified in the services they offer.

For example, our own company is engaged in all of these different services I have just mentioned.

Still another type of diversification is that of geography. Most companies are also spread over a large territory and therefore are not tied to economic fluctuations within a single industry or a single region.

Taken all together—sources of funds diversification plus services diversification plus geographic diversification—the finance industry is less vulnerable to isolated jolts than most businesses.

The last kind of stability, and a rather important one, is that of earnings. The earnings of the industry have compared favorably with other businesses.

In the current economy, the stability of finance industry earnings is strikingly demonstrated by our first-quarter record of this year.

This is primarily because finance companies have substantial earning assets in the form of receivables outstanding which are not affected by a short-term business slump. While there are fewer additional receivables coming on the books, the existing earning assets continue to provide a satisfactory level of net income. In other words, unlike most other businesses, we are not dependent upon current sales for current income.

Because of this built-in stability of earnings, finance companies have time to make necessary operating adjustments. For example, the fact that a large proportion of our funds is in the form of short-term debt permits us to reduce our debt expense during any prolonged recession. Again, unlike most other businesses, we are not heavily burdened with inflexible, fixed charges.

IMMEDIATE OUTLOOK

Turning to the immediate outlook... we are experiencing some increase in delinquencies and losses. However, these are still spotty and in no way alarming. As you know, all finance companies maintain adequate reserves based on long years of experience. We are also adversely affected, of course, by what is happening in the automobile industry.

Somewhat offsetting these negative factors is the sharp drop in the cost of money during recent months.

To summarize, the finance industry has five basic kinds of stability:

- Stability of Growth
- Stability of Function
- Stability of Market
- Stability of Diversification
- Stability of Earnings

Finally, let us consider very briefly the long-range outlook for the finance industry. In this connection, I would like to quote another excerpt from the FRB study:

"Whatever actual growth proves to be, it is reasonable to expect that instalment credit will continue to grow, to aid in the financing of expenditures for goods and services, to facilitate the spreading of new products, and to help raise living standards."

The FRB went on to project what the growth of our industry might be. Actual figures from 1950 through 1957 show the constant growth of instalment credit from \$14.7 billion to the \$34.1 billion figure at the end of 1957.

The FRB projection of the probable level of instalment credit in 1965 is between \$50 and \$55 billion. As a matter of fact, their report also indicates that a range of \$43 billion to \$75 billion is possible.

This can only mean very substantial growth for our industry, and obviously, it also means we will need a substantial additional amount of invested money as foundation for this growth. However, we feel we will be able to go into the money markets with confidence. We believe the finance industry, as a mature industry and with its many built-in stabilities including earnings, has demonstrated that it is a sound and productive investment for almost all kinds of funds.

California Municipal Bond Financing

ALAN K. BROWNE

Vice President, Bank of America N.T. & S.A.

REVIEWING THE PROGRAM of the 11th Annual Convention, I feel particularly honored in that my participation appears to be the only segment dealing with municipal finance. With so much attention being devoted to corporate enterprise, I hope that this brief interlude into the world of public finance will prove interesting, as well as informative.

Recently I addressed the Municipal Bond Club of Philadelphia on the subject of "The State of California and Its Finances." While some of the material presented is applicable to this discussion, augmentation, amendment and rearrangement is necessary. There is quite a difference in presenting a subject far removed from the area of locale, in comparison with a discussion on home ground. You have come to California—you can see it, hear about it, and otherwise are alert to what makes our economy tick. You are more than familiar with what is going on in California and consequently do not have to be exposed to basic statistics. Therefore, I do not intend to repeat material which can be obtained from obvious sources.

IMPORTANCE OF CALIFORNIA MUNICIPAL BOND FINANCING

You have heard about California and have seen parts of it. You are surely conscious of the size of the state and its population growth, both of which spell a demand for public improvements and services. Such improvements and services are usually reflected in various forms of public securities and revenue sources to service such debt. California is no different than other states in this respect, but like other geographical areas, local usages and customs often add their stamp to the end product.

California ranks second in land area and second in population among the 48 states. While steady growth has been

the order of business, the real spurt occurred following the close of World War II. To illustrate the importance of California Municipal Bond Financing, the following comparisons indicate that California has been responsible for 9.34% of the national total of long-term municipal loans sold during the period 1946-1957, and 8.26% of the national total of issues for the same period. Last year California accounted for 12.07% of the national total, in terms of par value, and 9.35% of the issues.

Year	Par Value		%	Issues		
	National	California		National	California	%
1957	\$ 6,958,152,145	\$ 839,693,486	12.07	6,888	644	9.35
1956	5,446,419,571	534,289,696	9.81	6,495	618	9.51
1955	5,976,503,820	664,265,500	11.11	6,660	575	8.63
1954	6,963,641,896	414,855,724	5.95	6,526	501	7.68
1953	5,557,887,369	460,829,530	8.29	5,795	462	7.97
1952	4,401,317,407	431,571,316	9.81	5,313	362	6.81
1951	3,278,153,053	267,014,300	8.14	5,281	389	7.37
1950	3,693,604,165	324,037,600	8.77	5,861	443	7.56
1949	2,995,425,049	303,380,504	10.13	5,107	334	6.54
1948	2,989,731,949	259,246,000	8.67	4,706	441	2.97
1947	2,353,771,562	151,043,000	6.42	3,803	340	8.94
1946	1,203,557,909	190,435,550	15.82	3,319	322	9.70
	\$51,823,165,895	\$4,840,662,206	9.34	65,754	5,431	8.26

I think you will agree that these figures are impressive and support the necessity of the investment banking fraternity seeking broader markets for California's Municipal Bond Financing. It also reflects a continuing and profitable source of supply. Therefore, if we can satisfy ourselves with the sufficiency and/or adequacy of credit, California's Municipal Financing offers an excellent opportunity to perform a satisfactory service to the borrower, supply customers with attractive yields commensurate with the credit

risk, and accrue reasonable underwriting and distribution profits.

INVESTMENT CONSIDERATIONS

In my recent Philadelphia speech I outlined what I thought were significant areas of interest to investors and dealers in municipal bonds, when appraising California Municipal Credits. I shall repeat them, as I believe they cover the principal comparative areas of analysis. It is true they go somewhat beyond the usual analytical criteria, but are designed to develop particular points of interest pertaining to California Municipal Credits, as follows:

1. The laws governing the incurrence of indebtedness and repayment thereof.
2. Sources of revenue for repayment of debt and limitations thereof.
3. Record of debt payment and treatment of defaulted debt.
4. Character of the population.
5. Methods and procedures in selling municipal securities.
6. Credit analysis and ratings.
7. Activity in national and regional markets.
8. Eligibility of securities for various fiduciary purposes.
9. Fiscal agencies for payment of bonds and coupons.
10. Local leadership in advocating sound municipal finance.
11. Potential debt problems.
12. Natural phenomenon.

Before discussing types of debt, I should like to briefly comment on the above points as they pertain to California Municipal Bond Financing. Then, if there is time, the discussion will be expanded by specific comments as they apply to various types of debt.

1. *The Laws Governing the Incurrence of Indebtedness and Repayment Thereof*

California's constitutional and statutory debt provisions, as applied to state and local government, are sound and conservative. Most bonds must be voted and require a two-third's approving majority. Unlimited taxing power is provided for general obligation bonds. Unusual provisions in the laws of the state are the exception. Limitations on debt incurrence are reasonable and not excessive.

2. *Sources of Revenue for Repayment of Debt and Limitations Thereof*

Unlimited taxing power on land and improvements, to support general obligation debt, is not burdensome. Assessed valuations are presumed to be set at 50% of actual value, but generally are much lower.

3. *Record of Debt Payment and Treatment of Defaulted Debt*

Historical records indicate general obligation debt has been met, and during periods of economic stress producing debt service delays, no debt compromise resulted. Intent to pay has been well demonstrated. As in other geographical areas, assessment type debt has been responsible for most defaults and scale-downs.

4. *Character of the Population*

California's population reflects the in-migration from the entire country, as well as from foreign countries. The diverse population sources spells the strength of the state. It has provided virility and diversification and has effectively absorbed those elements present in any commonwealth which, by their very nature, seek to call attention to their particular needs and views.

5. *Methods and Procedures in Selling Municipal Securities*

Public sale, requiring sealed competitive bids, is standard procedure. General advertising of notices of sale and a minimum of frivolous and onerous provisions is the order of business. Adequate and detailed information of a credit nature is generally available.

6. *Credit Analysis and Ratings*

Credit ratings are increasing, with Moody's rating over 300 credits and Standard & Poor's rating over 350. In addition, California Municipal Statistics, Inc., provides an outstanding service in supplying current statistical reports on all new bond issues.

7. *Activity in National and Regional Markets*

General market credits enjoy a good national market and local issues are well-supported in a strong regional market. One does not have to seek bids in Chicago and New York on our prime credits. Los Angeles and San Francisco dealers are able to bid on all marketable issues, regardless of size.

8. *Eligibility of Securities for Various Fiduciary Purposes*

Representative issues qualify for savings bank investment in Massachusetts, New York and Connecticut, as well as other states. It goes without saying, most issues qualify for various collateral and investment purposes in California.

9. *Fiscal Agencies for Payment of Bonds and Coupons*

There is a growing understanding of the desirability of providing Chicago and New York paying agencies for California Municipal debt. Many of the state's principal borrowers have provided this service for years.

10. *Local Leadership in Advocating Sound Municipal Finance*

An alert dealer group, spearheaded by the Municipal Securities Committee of the California group, IBA, polices legislation and local debt practices, to insure sound municipal finance. California's recognized municipal bond attorneys provide counsel on constitutional and statutory matters, in the interests of progressive debt management.

11. *Potential Debt Problems*

There are no major debt problems that are not being met. Problems, in a sense, are not based on credit weakness, but rather on debt incurrence. Usual in any area that has reached its maturity or is growing are those seeking to by-pass and circumvent debt restrictions. California is no exception.

12. *Natural Phenomenon*

Floods, earthquakes, subsidence, smog and drought have had their effect on areas in California. Damage has occurred and probably will continue to occur. Careful planning, sound construction and effective steps to combat or minimize such possibilities is normal California procedure.

While the State of California represents our prime credit and is our most prolific borrower, much has been said and recorded of recent date. On the other hand, the state's political subdivisions seldom receive such attention. Therefore, I propose to first discuss county debt, city debt, school district debt and other special taxing and revenue-producing entities.

COUNTIES

California's original constitution provided for 27 counties. Today there are 57 counties, plus the city & county of San Francisco. During that period, two counties changed their names: Buena Vista became Kern, and Branciforte became Santa Cruz—while Klamath was absorbed principally by Del Norte and Humboldt Counties. The smallest county is Santa Cruz, containing 435 square miles and an estimated population of 70,700. The largest county is San Bernardino, with an area of 20,175 square miles and a population of 435,700—and is, incidentally, the largest county in the United States. The most populous county is Los Angeles, with a population of 5,598,300. The least populous is Alpine County, containing 400 residents in an area of 776 square miles. The city and county of San Francisco is unique in that its population of 776,000 inhabits an area of 42 square miles. Actually, after deducting under-water property and publicly-owned property, there is but 14 square miles of tax-paying land.

County government in California is fairly uniform, with the majority of counties operating under general state laws, with a few—because of population problems—operating under charters.

There is nothing unusual about general county debt in California, except possibly the limitations on debt incurrence and the small amounts outstanding.

As of June 30, 1957, only 17 out of 57 counties reported general obligation debt outstanding (San Francisco will be treated under our discussion of cities) totalling \$66,390,000, principally issued for various county buildings and highways.

County debt is limited to 5% of the assessed valuation of the county. With very few purposes requiring county bond financing, county debt will always be of minor significance. It is for this reason that we feel our county bonds are one of the most conservative and stable forms of municipal debt in California.

While there is some record of county bond defaults prior to 1900, the only serious delays in payment occurred in Del Norte and Imperial Counties, primarily due to failure of the lumbering industry of the area in the case of Del Norte County and complication of related agricultural debt problems in Imperial County. Some temporary delays in debt service occurred during the period of the bank holi-

day in 1933. However, bond holders received payment in full in all instances.

County general obligation bonds require a two-thirds majority approving vote and must be sold at public sale on sealed competitive bids. They are supported by unlimited taxing power, subject to taxation by the respective counties.

If time permitted, I should have liked to detail some of the potential county debt.

CITIES

There are some 350 incorporated cities in California at last count. They are much like our new branches—liable to be activated at any minute. The smallest being Amador, located in Amador County, with a population of 151 and, of course, the largest being Los Angeles, with a population of 2,243,901.

Cities operate under the general laws of the state or under charters. There are a few variations in types of charter and at one time cities were classed according to population. Hence, at one time most cities not operating under charters were known as fifth or sixth class cities. Now they are termed general law cities.

Obviously, there are multiple reasons for city debt. Consequently, there is a greater frequency of bond authorization than in the case of counties. Some 250 of the 350 incorporated cities reported outstanding general obligation debt as of June 30, 1957.

Statutory debt limitation for cities is 15% of the assessed valuation. Certain chartered cities have some variations, such as excluding certain self-supporting utility debt from their debt limit or having a somewhat lower ratio of debt. The area of weakness in establishing debt limitation is when a city does its own assessing and produces a substantially higher property base than the county valuation. This may result in a somewhat heavier debt burden. Fortunately, very few cities do this, while a great many contract with their respective counties to assess and collect their city taxes.

METROPOLITAN AREAS

California contains 8 recognized metropolitan areas with a population, according to the 1950 census, of 8,353,014 of the state's total of 10,498,012. These areas are Fresno, Los Angeles, Sacramento, San Bernardino, San Diego, San Francisco-Oakland, San Jose and Stockton. Accordingly, we can expect that these metropolitan areas will account for the greatest outstanding debt and debt potential.

As in the case of county bonds, there are a few cases of city bonds defaulting prior to 1900. Defaults which took place during the 30's were usually of a temporary nature and were usually associated with adverse agricultural conditions and the bank holiday. However, bond holders received payments in full. Some confusion exists as to certain debt adjustments during this period. In all cases such adjustments were for special assessment type debt.

City general obligation bonds require a two-thirds majority approving vote and must be sold at public sale on sealed competitive bids. They are supported by unlimited taxing power on property subject to taxation by the respective cities.

SCHOOL DISTRICTS

Of all the types of districts in California, the most frequent borrowers are the school districts, using the term in its broadest sense.

School districts usually cover the elementary grades; high school districts, three or four years of high school; and junior college districts, the two years of post high school.

Districts may be union districts, comprising two or more districts of like instruction; they may be joint or joint union districts, indicating the districts are included in two or more counties or may be unified, indicating consolidation of elementary and high school districts, and also may include junior college districts.

Most districts are named for geographical areas, though some take the name of individuals—there are innumerable Washington, Lincoln and Jefferson districts. Some districts incorporate the word "city" in their title.

The entire state is divided into school districts, though some are inactive. The total of all districts is approximately 1,849.

School districts are limited to a 5% debt against their respective assessed valuations. A school district, high school district and junior college district could each indebted themselves for 5%, or a total of 15%. A unified school district, if comprising elementary school and high school functions, could bond themselves up to 10% and if a junior college function was included, 15%. Unionization and unification of school districts establishes a new basis for the debt limitation, as debt previously incurred by component districts is treated as debt of such districts and not of the new district.

School district bonds require a two-thirds majority approving vote and must be sold at public sale on sealed competitive bids. They are supported by unlimited taxing power on property subject to taxation by the respective districts.

The only record of delay on payment of school bond principal and interest was during the 30's, brought about by the same problems causing delays in county and city bonds, with one exception—the removal of property from tax rolls through acquisition by federal and state agencies. In all instances, bondholders received full payment.

Obviously, there is not time to discuss potential school district debt in California. Let us say, schools will provide a continuing source of bond issues.

SPECIAL DISTRICTS

Some 2,780 special districts, providing a multitude of public services, are in existence in California. Such districts are organized under 173 various acts, of which 135 are still on the books. The principal services covered, in the order of the greatest number of districts, are fire protection, cemetery and highway lighting. In all, there are 65 groups of services.

Of the 2,780 special districts, 1,096 are governed by boards of supervisors of the various counties and 1,684 are governed by local boards. Not all of the special districts are authorized to incur a bonded indebtedness.

With time growing so short, I cannot do more than touch on the principal borrowers.

BRIDGE & HIGHWAY DISTRICTS

Our only example is the Golden Gate Bridge & Highway District, comprising the city & county of San Francisco and counties of Marin, Sonoma, Del Norte and parts of Napa and Mendocino. Bonds are voted bonds, with unlimited taxing power to the extent that bridge toll revenues are inadequate. There is no financing contemplated in the near future.

MUNICIPAL UTILITY DISTRICTS

There are some seven such districts. I shall only comment on two:

The East Bay Municipal Utility District, services parts of Alameda and Contra Costa Counties. Bonds are voted bonds with unlimited taxing power to the extent that water revenues are inadequate. A \$252,000,000 bond issue is being submitted to the electorate in June.

The Sacramento Municipal Utility District, serving Sacramento County and part of Placer County, has an authorized but unsold revenue bond issue in the amount of \$85,000,000.

METROPOLITAN WATER DISTRICT

The Metropolitan Water District of Southern California is probably the best known of our special districts. The district is located in five counties and includes many incorporated cities and special districts. Bonds are secured by sale of water, annexation charges and taxation to the extent necessary. It is contemplated that additional financing will be accomplished in the years ahead.

TRANSIT

The San Francisco Bay Area Rapid Transit District, comprising five counties, is currently being organized and staffed. Approximately two years will be necessary before a bond issue can be presented to the electorate.

The Alameda-Contra Costa Transit District, comprising the two counties, hopes to place a bond issue before their electorate this November in order to acquire certain properties of the Key System operating buses and trains in the East Bay Area.

The Los Angeles Metropolitan Transit Authority has sold its \$40,000,000 revenue bond issue. No new financing is anticipated for some time.

As can be expected with so many diverse districts providing a wide range of public services—including flood control and water conservation; harbor & port; hospital; park, recreation and parkway; parking; sanitary and sanitation; water and waterworks, to mention a few—details are so varied that it would be impossible to record them. I am sure that I would be imposing on your patience should I attempt to discuss them further.

Historically, district bonds secured by special assessments have created our greatest credit problems. Over the years, ill-conceived irrigation projects and local improvements have resulted in defaults and debt adjustments. With minor exceptions, all such credit problems have been adjusted. In many cases bondholders accepted reduced interest, extended maturities and in certain instances reduction in principal, accomplished in part by new bonds or cash payments.

In passing, I should like to comment on trends in revenue bond financing in California. Outside of the California Toll Bridge Authority, Imperial Irrigation District and the Department of Water & Power of the City of Los Angeles, very few revenue bond issues were authorized in recent years. This was primarily due to legal interpretation of court decisions. With this matter cleared by additional decisions, more revenue bond issues may be expected.

STATE DEBT

Article XVI of the California Constitution sets forth the limitations and method of incurring state indebtedness. In effect, the legislature is prohibited from creating debt which shall exceed \$300,000 in the aggregate, except in case of war to repel invasion or suppress insurrection. The legislature may authorize debt by law for some single object or work, provide ways and means for debt service, but such law does not take effect until after submission to the electorate at a general election and a majority is received of all votes cast for and against the measure.

In practice, all state bonds are authorized by constitutional amendments voted upon at general elections and must receive an approving majority of all votes cast. Such procedure, of course, does not apply to revenue bonds and registered warrants and did not apply to debts incurred in connection with the Indian Wars and Civil War.

The laws authorizing state indebtedness must provide ways and means, exclusive of loans, for the repayment of principal and interest thereon, within the life of the bond issue, not to exceed 50 years (formerly 75 years) from date of issue.

All voted general obligation bonds of the State of California are payable from the state's general fund, though revenues accruing in special funds for the benefit of specific projects may be transferred to the general fund to service related debt.

The only prior liens ahead of the state's general obligation bonded indebtedness are constitutional pledges for the support of the public school system and the state university (Article XIII, Sec. 15) and (Article IV, Sec. 34A).

The state is authorized under provision of Article XIII of the state constitution to tax real and personal property among other forms of property not specifically exempted from taxation, in proportion to its value. The assessed valuation of the state for 1957-58, estimated at 28% of actual value, is \$24,308,182,706.

Prior to adoption of a constitutional amendment in 1910, California's principal source of revenue was from property taxes. The amendment substituted, primarily, a public utility gross receipts tax. In 1935 this tax source was returned to local tax rolls and personal income and retail sales taxes, as the principal sources of state revenue, were substituted.

Thus, while there is authorization for the state to levy property taxes, no such tax has been levied since 1911, nor is there any machinery for the levy and collection of such taxes, except through local sources. In effect, the state's revenues are now tied to the business cycle.

Looking back to the early history of California, during

the first decade of its existence as a state, the proceeds from the sale of state bonds were the main source of funds for financing the operation of the state government. Between 1850 and 1857, \$3,100,000 par value in bonds were issued.

California was in default in interest in January 1854. In 1856 the Supreme Court of the State declared all debt in excess of the \$300,000 constitutional limitation null and void. In 1857 the legislature passed an act calling in the various illegal issues and authorizing \$3,900,000 new bonds to be exchanged for the old. In 1860 an additional \$200,000 bonds was authorized to correct an error in the original refunding. Since then there has been prompt payment of principal and interest when due.

With this brief background detailing how general obligation debt of the state is authorized, its measure of tax support, its priority of lien and its default record, let us look at the current debt picture.

In recent years the principal purposes for which state debt has been authorized are veterans aid and school aid. Exclusive of \$16,237,000 San Francisco harbor improvement bonds, outstanding debt as of the last bond sale (January 22, 1958) included \$11,475,000 highway bonds and \$5,515,000 various purpose bonds issued for state building and university buildings and tenth Olympiad bonds.

The veterans assistance program, conceived as a means of providing lasting benefits to veterans of World War I instead of "bonus" payments, was approved by the legislature in 1921, and the first state veterans bond issue, in the amount of \$10,000,000, was passed at the 1922 general election.

The assistance program is essentially a plan to provide California veterans of World War I and World War II and those who served during the Korean crises from June 27, 1950 to January 31, 1955, with an opportunity to buy modest permanent homes and farms on an installment plan, at relatively low rates of interest. Careful appraisals are made of property to be purchased and sound mortgage practices are followed. While changes have been made in the plan to permit adjustments to changing market values and interest rates, the plan has been conservatively administered and completely self-supporting since inception. The current maximum purchase price the state will pay is \$15,000 for a home and \$40,000 for a farm. Any additional cost must be paid by the veteran. Currently the interest rate is 3½% and no secondary financing is permitted. There is also a moratorium on re-financing of other mortgages into Cal Vet Loans. The benefits are limited to natives of California and those who resided in the state at the time of entering service.

Since the approval of the first veterans bond issue in 1922, a total of \$1,135,000,000 bonds have been authorized for veterans' purposes. Of this amount \$794,010,000 were outstanding and \$50,000,000 remain unsold as of the date of the last bond sale, April 23, 1958.

At the special session of the California Legislature a bill has been introduced to submit to the electorate in the November General Election an additional issue of \$300,000,000 for veterans aid and was approved. It is also apparent that the Department of Veteran Affairs and the legislature are aware that either some means of financing the assist-

ance program other than the continued authorization of general obligation bonds must be provided or it will be necessary to revise the program on a more restricted basis.

In my opinion the latter course will be the ultimate procedure. The assistance program cannot afford to have a turndown of a bond issue by the electorate, nor to become involved in a form of financing which will raise interest costs to veterans.

The next sizeable item in California's debit picture is the state's aid to needy school districts.

Prior to 1947 local school districts provided their own funds for school building construction through the issuance of district bonds and/or by special taxes. Of course, state subventions to local school districts in order to provide equal educational opportunity throughout all areas has been a constitutional requirement (Article IX, Sec. 6 and Article XIII, Sec. 15). It sets the minimum amount to be placed in a state school fund at \$180 (now \$193.37) per unit of average daily attendance in the public schools during the preceding fiscal year. It requires that the entire amount of the fund for each fiscal year be apportioned during the fiscal year for the support of the public school system. Such amounts at present represent approximately 46.6 percent of the total income of the general funds of school districts. Local district taxation of real and personal property for school purposes accounts for slightly more than 48.1 percent of the total.

State aid for school building construction purposes involved an initial appropriation of \$55,000,000 from current income in 1947. In 1949 the first of several state school building bond issues was approved in the amount of \$250,000,000. Since then, a total of \$635,000,000 have been authorized. \$507,600,000 are outstanding and \$50,000,000 remain unsold as of the date of the last bond sale, April 23, 1958.

As in the case of veterans aid bonds, a bill has been introduced to submit to the electorate in the November General Election an additional issue of \$220,000,000 and was approved.

The salient features of the state school building aid program are:

1. Districts must have a demonstrated need and have bonded themselves to 95% of their statutory limit (5% of the assessed value of the district).

2. Districts must approve such state loans in the same manner as bond issues (2/3's approving vote and must pay a rate of interest somewhat above the cost of the state's borrowing costs).

3. Districts' obligation to repay is for a period of 30 years. If not paid by then, the debt is cancelled.

4. The requirement to repay loans varies according to ability. Full repayment is not anticipated. However, some districts will pay in full. Aided districts must levy a 40-cents tax rate per \$100 assessed valuation for debt service on their own bonds and repayment to the state.

5. The state agencies administer the program effectively to provide uniformity in costs and to insure buildings are for classrooms and not for special purposes such as cafeterias, gymnasiums and auditoriums.

The people of the State of California take the education

of their children very seriously. The existing aid program has been constructive and of permanent value. Still, there will always be areas of inadequacy and emergency. To this end the governor, the legislature, local district officials and boards and parents are giving their continuing attention to ways and means to meet the problem.

While there has been some decline in requests for state school aid, the pressure of growing school population expected in the next five years will exert itself.

I would expect a continuing state aid program using the credit of the state. However, much is to be done at the local level, through consolidation and unification of school districts, simplicity in design of buildings, lower costs of construction, better long-range planning of needs, and use of the school plant for 12 months of the year. I do not believe that there will be much enthusiasm for lease-purchase methods of acquiring school buildings or rental of buildings from authorities, which inevitably would increase borrowing costs to local districts.

The third largest item of state debt is San Francisco harbor improvement bonds outstanding in the amount of \$16,237,000, and \$697,000 authorized but unissued as of January 22, 1958. An additional issue of \$60,000,000 will be submitted to the electorate at the general election in November this year.

The Governing Board, now known as the San Francisco Port Authority, administers the wharves, piers, sea walls and state belt railroad of the San Francisco harbor. Its operations have been fully self-supporting. Three old 4% term bond issues—one due 1985 and two in 1989—are gradually being retired from sinking funds. The operating revenues accruing to the San Francisco Harbor Improvement Fund are the source of debt service with access to general fund revenues, if needed.

Like all port facilities, a constant program of maintenance and modernization is required to meet competitive conditions of trade. The port of San Francisco is not the sole port facility on San Francisco Bay and its tributaries. Oakland, Richmond, Stockton, Sacramento and Redwood City actively compete for business for their municipally owned terminals.

Preliminary steps are being taken to survey the advantages of an over-all port administration and the legal and financial problems that may be encountered. As gateway to the Pacific and the Orient I cannot conceive the San Francisco port losing its important maritime position in domestic and world trade.

California still has \$11,475,000 highway bonds outstanding, due serially to 1965, payable from the general fund, though in effect debt service is provided from the proceeds of the motor vehicle license fees. Highway bonds were issued many years ago under several acts, to provide funds for a state highway system.

The principal source of funds for the state's highway system, local streets and motor vehicle regulation is from the state gasoline tax of 6 cents per gallon, motor vehicle fees and a motor vehicle transportation tax which, combined, is estimated will total \$551,000,000 for the 1957-58 fiscal year. The capital outlay program of the State Highway Department for 1958-59 is proposed to be \$226,-

457,000 and assistance to counties and cities, \$122,346,000.

There have been many proposals over the years for the state to issue revenue bonds secured by gas tax revenues and to issue toll highway revenue bonds. In addition, efforts have been made to divert such revenues for other than highway purposes—all have been defeated.

California's highway system is excellent and sizeable. Unless conditions changed appreciably, I would not predict any change in the state's present system of orthodox financing of highway improvements.

The balance of California's general obligation debt represents several old issues maturing up to 1971, offset to some extent by sinking funds totalling \$3,325,000.

There is an authorized but unsold bond issue amounting to \$200,000,000 for state buildings and institutions. It is expected that some bonds will be sold this year. In recent years some \$600,000,000 has been spent from general revenues for improvement of the state's buildings and institutions.

At the current session of the Legislature an act authorizing an additional building bond issue in the amount of \$200,000,000 has been approved.

That completes our look at the State of California's general obligation debt picture. There is nothing unusual or particularly startling, except possibly the growth of state debt and the size of the individual bond issues. Most of the material I have presented has been recorded in one form or another. But some repetition is essential for an understanding of the state's credit.

Looking ahead, as you can see, we can expect additional State of California general obligation bond issues. Their marketing will of necessity be orderly and in keeping with the ability of the market to absorb them.

California has the wealth, diversified natural resources and productive capacity to sustain its growing population, meet its obligations and provide necessary public facilities and services. Its over-all debt burden is moderate, property values are assessed at a fraction of their market value, and several additional sources of revenue are still untapped for state purposes.

The state weathered the storms of the 30's manifested in the "Epic" program, "Thirty Every Thursday" and "Ham and Eggs", as well as budget deficits brought about by the depression and maladjustment of revenue sources resulting in the registering of warrants.

While there will always be elements of the population willing to advocate and support plans benefiting themselves at the expense of others, California has been able to dilute such groups by the stabilizing effect of its basically conservative native son and daughter population and the post-World War II influx of young veterans and others seeking to establish homes and farms and to seek to add to the state's productive capacity.

As this is an election year, it can be expected that the budget session of the California State Legislature will have political considerations on its mind when tackling the problem of meeting the state's fiscal requirements. Apparently no new taxes are contemplated. Deficiencies are to be met by use of reserve funds. However, estimates on taxes tied to the business cycle are a bit optimistic in the

light of current business trends. I would expect a more realistic appraisal of expenditures and revenues at the 1959 session of the Legislature. Elections will be over and the 1957-58 and the first half of the 1958-59 fiscal years will be a matter of history. Meanwhile, the CIO-AFL is sponsoring an initiative constitutional amendment to reduce sales and amusement tax from 3% to 2% and revise income tax rates so as to increase the tax on the upper income tax brackets and reduce the lower brackets.

A final word on California's finance. Much has been said about the state's water problem. California as a state has areas which have an abundance and surplus of water lying in the northern counties. The southern part of the state is an area of deficiency. Plans to bring water from the north to the south have been stymied by failure to agree on basic principles. Simply stated, the south has been unwilling to agree to any program that will not insure delivery of water to her areas of need. The north is unwilling to permit its water to go south, unless assured of being able to withdraw water if a need arises at some future date and will have guarantee of financial support if required in developing its water resources, as needed.

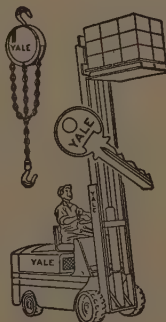
I am certain that a workable plan will be evolved, based on a constitutional determination of water rights. Methods of financing the California water plan have been suggested in the form of a state general obligation bond issue, a guaranteed state water authority bond issue, pay-as-you-go, and various forms of local finance, including the creation of a metropolitan water district of northern California. In any event, no immediate financing by a bond issue is contemplated. Amounts have varied according to different estimates—the largest being around 1½ billion dollars.

That covers the principal points. If I have over-simplified some of the material or dwelled too long on dry statistics, please bear with me, as the subject is difficult to condense within time limits.

YALE & TOWNE

Declares 281st Dividend

37½¢ a Share



On May 28, 1958, dividend No. 281 of thirty-seven and one-half cents per share was declared by the Board of Directors out of past earnings, payable on July 1, 1958, to stockholders of record at the close of business June 10, 1958.

WILLIAM H. MATHERS
Vice-President and Secretary

THE YALE & TOWNE MANUFACTURING CO.
Cash dividends paid in every year since 1899

ST. LOUIS' "PROGRESS ROADS" . . . Today, St. Louis—the Strategic Center of America—battles for progress. Its vast \$400 million "Progress Roads" project is a symbol of this new spirit . . . a spirit that is creating the biggest program of public Improvements in St. Louis history.



City on the move. No fewer than twenty-five expressways, highways, and "Progress Roads" projects are now in the planning and pouring stage in St. Louis. Already open for traffic is the \$13 million Third Street Interregional Highway which sweeps along the eastern edge of the city from the downtown area. In the mushrooming St. Louis

county area, concrete "clover-leaves" will soon be as familiar as the ubiquitous shopping center.

New highways, new schools, libraries, housing developments, docks, office buildings, and factories are being built. Everywhere, not only in concrete but in spirit, the area which Union Electric supplies with power is on

the road to a brighter future. And Union Electric itself is very much a part of this progress . . . having doubled its capacity and its output in the last ten years. In the next five years, it will spend \$290 million for more expansion.

Union Electric is a growing company in a growing St. Louis . . . the Strategic Center of America.

UNION ELECTRIC

The Manufacturer's Viewpoint

JAMES R. BRADBURN

Vice President, Burroughs Corporation

YOU MUST BE CAUTIOUS in generalizing about the electronic computer industry. That term "computer" is widely and loosely used. First of all, it describes at least two species of hardware, analog and digital, whose technical differences are undoubtedly familiar to you.

Second, computers are differentiated by usage and application. We frequently get confused over who is in the computer industry, because a wide variety of applicational usages are commonly quoted to us, such as business data processing, mathematical computation, process control, military control and guidance. We can also divide computers according to their complexity: there are very small desk size devices called computers; and equipment the size of this room, also called computers. The term by itself does not mean too much. If it is to be meaningful, you must take a specific look at the product involved.

The computer industry, broadly speaking is, of course, classified as a capital goods industry. It is made up of a large number of suppliers: some large; some small; some integrated; some who produce only certain types of computers; and others who have added computers as part of their product line. In these, of course, are included the business machines corporations and companies which build computers, in some sense, as their complete line of equipment; and others, simply as part of a diversified product line.

In the business machines field, computers are used in a number of different ways. The term business data processing probably covers most of them. But, of course, we find the computers built by business machine companies being widely used in various mathematical and computational laboratories as well.

Historically, the use of computers came about as a means of mechanizing clerical routines, to take the drudgery out of hand computation. Initially these basic computers or desk calculators were part of a total processing system. The system, of course, did not depend upon the machine. Paper-work flows from one desk to another, or from one computation to another; the machine is simply a part of the overall flow. And because the flow of work is independent of the machine, people must be trained for each individual step or process, each job which is to be done.

Now a different concept, where the procedure or process is totally embodied in the equipment, was conceived quite

a while ago if you will look at the historical record. In 1833 a man named Babbage in England invented what he called a "difference machine," a computer which was set up to follow a pre-conceived sequence of steps. Actually, the thing did not work because the techniques of the day were not up to his concept of machine design—though a lot of money was spent on it. But it was the forerunner of today's internally stored machines.

Now between these two machines, the present stored program machines and the initial concept of Babbage, came first plugboard control of punched card equipment, card programmed calculators, commonly known as CPC's, and finally the internally-stored program machine in which the program is actually stored within the confines of the machine itself. The machine then goes through this program, which in turn modifies itself depending either upon the pre-stated conditions, or the results which it encounters.

The first of such machines, to give you a little history on this thing, started back about 1944 when the Mark I Calculator was set up at Harvard University. It was called an Automatic Sequence Control Calculator. About this same time, a lot of work was going on at the University of Pennsylvania by two men known as Eckert and Mauchly who developed the ENIAC Computer.

From a start of practically no sales at the end of the 1940's until 1957, when (and you can always get any numbers on this you want to look in the record for), we will say, about \$350 million worth of sales were made, the industry has come a long way.

Parallel to this growth is the growing need for mechanizing clerical functions. I think one of the things we are all struck by is the tremendous growth in the number of clerical people in industry as compared to the factory, hourly employed worker. The growth of the clerical function has been much faster and, therefore, has the greater need for mechanization.

The computer business not only has grown in total volume, but those who have been working in it have certainly experienced a wide range of activities and gained valuable insights into a unique business.

In the first place, the technology of this industry, as most of you know, has grown tremendously in the past few years. This growth of technology has, I think, been overplayed to a degree in publications . . . to the extent that

everybody expects a new computer tomorrow, and others are worried about what they are going to do with yesterday's computer. I do not think this is quite the problem it is made out to be.

Nevertheless, there are certain unique characteristics which go to make up this computer industry. In the first place, one of the biggest problems (and I am talking about the industry's problems generally now, not just my company), is that of trying to set down a clear-cut set of specifications of what the equipment must do, how it must function, what it is to cost to make and sell, what it will cost to maintain, and other features of this nature.

On the basis of these specifications, design takes place. And this has required a whole new set of techniques and developments from the laboratories and other development centers. You will recall that the reason Babbage could never make his machines work was because the techniques of the day were not up to his logical concepts of machine design. And so today, too, expenditures in research and development are needed to provide the techniques which the logics of the machines require.

As far as production is concerned, the manufacturing phase of electronic computers is probably as simple as any, particularly from the viewpoint of business problems. In the manufacturing of these devices, a large quantity of standard components are used. Now these may look like just ordinary radio tubes and radio components, but unfortunately they are not quite, in that you demand a high reliability characteristic from such equipment. However, the value added by manufacturing in most of the companies in the computer business is low. In other words, it is a matter of taking a large amount of material, of parts, components and so forth which others manufacture, and assembling and testing them in complete computing devices.

This requires, however, a high degree of inventory control, a large investment in inventory, and a large investment in plant and equipment in order to test and prove out this equipment. Some of this equipment, particularly in our own case of medium sized computers, will take up two test stands the size of this room for testing through two complete systems of computers. So you see, it takes a sizeable floor area in order to process equipment of this nature.

One of the biggest problems we all face in the industry is that of trying to get personnel who can operate in this field, who have enough background and knowledge. This involves immediately a large-scale training program; training not only of our own personnel, but also training customer personnel in use and maintenance of the equipment. Training these people requires classrooms, and lectures, and actual hardware out in the field. It involves a lot of decision making from the manufacturers who must decide what to teach, and how to teach, and who is going to pay for it.

When we get over into the field of marketing, we begin to wonder just what it is we are selling. Actually it turns out, we are not selling hardware. We are selling service, service to the users. In other words, we have to sell what the equipment will do, and not the equipment itself. And this involves a great understanding of the users', or the customers' problems.

The big question, of course, which is facing everyone in

the industry today, and which I am sure most of you recognize, is how far can the manufacturer go, and how much can he afford to spend in solving the customers' problems. I am talking here about application of the equipment, largely in standard business data processing fields—insurance, production control, payroll, and other such uses.

You might think we could use standard applications among various customers. But, unfortunately, we are met with, "My problem is different." We have tried to get around this in the industry and, to a greater or less degree, have through the use of applied programming, compilers, auto-monitors, assembly routines, translators, and so forth. I will not try to define all these terms. They are simply devices which allow a customer to state his problem in familiar language which is then translated into a program code the computer can use.

Pre-sale application work often involves the use of demonstration data processing centers. Applicational analysis sometimes requires the manufacturer to do actual demonstration programming to show the customer how he can use this equipment to best advantage.

But the big question is, as I pointed out, how far can the manufacturer afford to go in doing the work for the customer? Somebody has to pay for it sooner or later. And, of course, the customer does pay for it. The question arises, however, could this work be done profitably by the customer himself, or through the use of consultants and management firms, or by paying for it in the price of the equipment?

MANUFACTURER'S SPECIAL PROBLEMS

There are special problems facing the manufacturer today in this industry. One of the biggest problems is this matter of obsolescence, and here, I think, the issue breaks down solely on the grounds of definition of what is obsolescence, and therefore what affects it. A lot of people go around quoting the statement that "If it works, it is obsolete." We are accustomed to reading today in the Wall Street Journal about yesterday's invention in the research laboratory, and thinking this is going to affect tomorrow's computer on the market. It is not going to. I can assure you of that.

A lot of other people judge obsolescence on the basis of whether something wears out. I think education will gradually clear this misconception. To me, a piece of equipment is not obsolete as long as it will do the job, or as long as there is not another piece of equipment which will do the job, and which will cost enough less than the present equipment to pay for the new equipment, out of its savings, in a reasonable period of time. Now if one applies this definition, which I think is a good one and an accepted one among cost accountants, he is not going to readily obsolete present-day equipment. This is not to say new improvements are not going to come along, but they are not going to immediately toss out equipment that is presently installed.

Purchase versus lease is another big problem facing the manufacturers because this has a significant effect on their current profit and loss statement. Stop and consider this with me for a minute. If I ship a computer in December

which I have sold to a customer, I take immediately into my P & L statement the profit I make that year on that computer. If I ship it on a lease, I take nothing that year. I will not be taking anything in as profit except as I bring in my income under lease in subsequent years. Then I am only returning it little by little. This makes it very difficult, of course, for anyone who tries to analyze a statement as to where just anybody stands in this industry. It is pretty hard for us to tell ourselves, let alone an outsider who is trying to analyze it without getting all the values down that are presumably available to the manufacturer himself.

Another big problem that the industry faces is, "When is an order an order?" There have been a lot of people getting letters of intent; a lot of companies issuing letters of intent to a number of manufacturers at the same time; and every manufacturer is quoting the total number of orders including these letters of intent. This has been very difficult for all of us in the industry to assess. Unfortunately, I do not know what the answer is to that one.

Another problem is deferment of deliveries, particularly in the last several months. These deferments, while largely for economic reasons have been brought about by secondary reason which is equally significant—namely that of customers not being ready to install the equipment at the time they have requested it . . . their being unready, as it were.

All these factors, then, have a significant effect on profitability to the manufacturer. People in the industry, to start with, have a lot of make-ready costs. We have the physical problem of getting tooled up and getting people hired to do the job. For example, if we ship under lease, we have to train, several months in advance, maintenance people to install and maintain that equipment in the field. This all has to come out of costs in advance of the shipment, and if the equipment goes out under lease, then those charges are not recouped until sometime later. This in itself can be a

significant problem in affecting an immediate profitability figure.

The second make-ready cost is a technical one: getting the staff and technical work done in the way of development to keep in advance of this field; continually trying to reduce manufacturing costs through better control; and finding better means of maintaining equipment at a lower price. All these add up, of course, to the problem of growth in this industry. And growth is expensive in any industry in that you have to train significant numbers of personnel on the basis of estimated productivity before you get your costs back.

But what happens in the long run, we all hope, is that with equipment going out properly priced, these costs can well be recouped over a period of time. This is being shortened, in most cases, because many lease customers have found their productivity requirements rising. They have found more and more uses for their computing systems.

So they begin second and third shift operations. And when equipment is under lease, this significantly helps the P & L statement of the manufacturer. If they are under purchase, of course, that usage redounds to the benefit of the user and not the manufacturer.

So we have this problem, too, of growth coupled with leasing which significantly affects the profitability of this computer industry. On the other hand, if the thing turns around like industry in general has done, then you have the problem of what to do with these fixed overheads, the common problem of volume variance of costs. We have not experienced this. Generally what we have experienced in the industry this year is a significant slowing down and spreading out of our delivery problems rather than any immediate cancellations. Most have been deferments. This has been our experience and, I think, the experience of everybody in the industry.

REGULAR QUARTERLY DIVIDEND

The Board of Directors has declared this day
COMMON STOCK DIVIDEND NO. 96
This is a regular quarterly dividend of

25¢ PER
SHARE

Payable on August 15, 1958
to holders of record at close
of business July 18, 1958.

Milton C. Baldridge
Secretary
June 5, 1958

**THE COLUMBIA
GAS SYSTEM, INC.**



OUTBOARD MARINE CORPORATION

DIVIDEND NOTICE

A cash dividend of twenty cents (20c) per share on the Common Stock of the Company has been declared by the Board of Directors, payable May 23, 1958, to stockholders of record May 9, 1958.

H. M. FISHER, Secretary

April 28, 1958.



COMMON STOCK DIVIDEND

93rd Consecutive Quarterly Payment

The Board of Directors of Seaboard Finance Company declared a regular quarterly dividend of 25 cents a share on Common Stock, payable July 10, 1958 to stockholders of record June 19, 1958.

PREFERRED STOCK DIVIDEND

The directors also declared regular quarterly dividends of \$1.18¾ on the \$4.75 Sinking Fund Preferred Stock, \$1.25 on the \$5.00 Sinking Fund Preferred Stock, \$1.25 on the \$5.00 Convertible Preferred Stock, Series A and B, all payable July 10, 1958, to stockholders of record June 19, 1958.

EDWARD L. JOHNSON,
Secretary

April 24, 1958

The Application of Computers to Scientific Management

HERMAN C. HEISER

Partner, Lybrand, Ross Bros. & Montgomery

A GREAT DEAL OF EFFORT has been expended in the past several years by many companies, universities and management consultants in research, system engineering, and applied management sciences which has led to the development of successful applications of electronic data processing systems to scientific management. A great deal of material has been published in this field and a great many technical conferences have been held for the purpose of exchanging knowledge in this new technology. I believe it is possible at this time to classify the applications in a general way so that a comprehensive view of the field may be obtained. This should enable executives to better evaluate the feasibility of harnessing the power of electronic equipment to systems specially designed to solve many of their managerial problems.

TYPES OF APPLICATIONS

Applications of electronic computers to business systems might be classified in three broad areas:

1. Large volume clerical operations
2. Unification of data processing activities
3. Scientific solution of management problems.

There are a considerable number of large companies such as insurance companies, railroads, banks, utilities, etc., who carry on extremely large volume clerical operations involving, in many cases, hundreds of clerical personnel. In such cases equipment operating at electronic speeds can be used to automatically handle such large volumes of data and consequently substantially reduce clerical costs.

In other companies where single large volume clerical operations do not exist, it has been found advantageous through systems engineering, to reorganize the data processing activities for the purpose of unification. This approach applies the concept of integrated data processing and makes it possible to utilize electronic data processing equipment beneficially.

The complexities of modern business have motivated specialists in the physical and social sciences to pursue the possibility of borrowing many of the techniques from these sciences in formulating solutions to business problems. The field of "operations research" has been developing at a rapid pace recently and such development has been greatly stimulated and accelerated by the availability of electronic machines to solve management problems using these new techniques. The term "operations research", in my opinion, is a poor one and I prefer the term Applied Management Sciences as being more descriptive. Let us now consider each of the types of applications we have just enumerated.

LARGE VOLUME CLERICAL OPERATIONS

In the case of large volume clerical operations, the prime motive for research and systems engineering leading toward

the acquisition of large scale electronic data processing systems is clearly cost reduction. As clerical costs mount, it becomes necessary for large companies to take steps to counteract the increasing pressure of these mounting clerical costs on profits. In addition to the obvious benefits to be derived from clerical cost reduction there are several correlary benefits:

1. As data processing functions are automated, a much greater degree of accuracy can be obtained and improved control procedures can be instituted, and
2. Important statistical and control data can be produced as a by-product of an automated system.

At the present time, to a relatively great extent, large-scale, general-purpose computers have been used for handling large volume clerical operations. The principal emphasis in these cases is placed upon systems engineering dealing with input and output problems. Equipment manufacturers are devoting considerable research and engineering effort to develop new equipment to handle these problems. This is necessary in order to find better methods for recording vast amounts of data and converting this data into machine language at speeds compatible with the processing speeds of computers. Considerable progress has been made in the development of high speed printers for preparing documents, such as invoices. Methods of storing information, however, present another problem. There is presently available a wide selection of storage devices ranging from relatively low cost magnetic tapes to expensive high speed core memory. It is axiomatic that as the access time characteristic of a device decreases the cost of such a device increases. It is obvious, of course, that stored information or files should be maintained in such a manner that any required item or items can be quickly and easily located and extracted. The problem of the systems engineer is to balance the storage requirements against the cost of available storage media. This is necessary since there is a wide range in costs between the magnetic tape, disc storage and high speed core memory.

While the application of electronic data processing systems to large volume clerical operations has been quite extensive to date, it is also true that the number of companies having large volume clerical operations represent a very small part of the business community. Consequently, it logically follows that, at the present time, there is increased activity in studying potential applications of electronic machines to handle a variety of data processing jobs.

UNIFICATION OF DATA PROCESSING ACTIVITY

The sophistication and power of electronic computers and the peripheral equipment that makes up an electronic data processing system make it possible to apply a new concept to business paper work. Because of the limitations

of manual methods and mechanical office machines, clerical and administrative functions today are highly departmentalized. In each segment or division of the overall organization, such as sales, production planning and scheduling, accounting, purchasing, etc., paper work systems have been devised specifically to serve the needs of each separate activity. As a result, companies are supporting increasingly costly clerical activities which are duplicated in a great measure in several departments. I am sure that it will not be necessary to dwell on this state of affairs since almost every executive is well aware of such conditions existing in his own company. With this background, the motives for a company to unify data processing activities become quite clear. Among the more important of these motives are:

1. Data processing cost reductions through work simplification
2. Improved reports and records through an extension of the principle of exception reporting
3. Improved timeliness of reports
4. The benefits to be derived by reducing paper work lag time.

The principles of work simplification have been applied to studies of paper work activities in companies for many years. The objectives of work simplification include the elimination of duplication of records and the elimination of extraneous data. The use of electronic equipment makes it possible to create centralized pools of information which can be used for many purposes supplanting existing single purpose pools of information maintained in separate departments for their specific purposes.

Since electronic computers have logical capabilities, it is possible to do a considerable amount of analytical work automatically and consequently to improve reports and records by culling out inapplicable data which do not serve to enhance the report. It is an accepted principle that the most effective reports highlight exceptions and consequently are more useful to executives by indicating more clearly action to be taken.

Probably the most frequently encountered complaint of executives is the lateness of reports. No one will deny the necessity for timely reports but under present manual and machine methods it is not usually possible to better the reporting time schedule because of the necessity to serially process data before finished reports can be prepared. In other words, it is not possible to prepare certain reports until preceding reports are completed. Electronic data processing systems, because of their great capacity, hold great promise of producing more timely reports for management use.

There are many intangible benefits to be derived from reducing paper work lag time. Can I give you just one example? I am sure that you can find many more in your experience. In a recent study we made involving minimization of inventories we recognized that the lapse of time between the receipt of an order from a customer, for delivery of product from stock, to the receipt of replacement stock was predominately affected by the time necessary to perform the necessary paper work and to communicate from point to point. The length of time required to replace

stock affects, of course, the minimum amount of inventory necessary to carry on hand. Therefore, a substantial reduction in the paper work time lag has a material effect on the size of the inventory.

Systems engineering projects involving the unification of data processing activity require the expenditure of considerable effort, since such projects contemplate the redesign of many overall procedures. However, it has been the experience of most companies that have undertaken such projects, that substantial benefits are realized even though they did not immediately acquire an electronic computer. Further, such studies and re-engineering are prerequisite to the application of electronic computers which a great many companies will undoubtedly wish to accomplish at a future date.

SCIENTIFIC SOLUTIONS OF MANAGEMENT PROBLEMS

In our discussion of the role which electronic computers will play in business in the future, we must include some discussion of applications involving the use of scientific techniques in the solution of business problems. This growing field of endeavor, which is sometimes called "Operations Research" or (as I prefer) Applied Management Sciences, deals with the application of techniques drawn from the physical and social sciences, such as mathematics, engineering, statistics, logic, etc. To understand the reason why this field has been growing in importance we might review for a moment the matter of management decisions. Management decision can be classified in two broad areas.

1. High level decisions, and
2. Routine decisions.

High level management decisions involve complex patterns of criteria and require the exercise of a high level of managerial judgment which has been developed by long years of experience. Such types of decisions are often highly intuitive. Routine decisions involve fundamental criteria and are usually made frequently in a repetitive pattern.

Few management decisions, however, are intuitive and an extremely high percentage of decisions which are currently made in the operation of a business are routine in nature and follow logically from established policies and management directives. This type of decision upon analysis, will usually yield to a formulation of a pattern of logical decisions leading to the solution of a business problem. The formulation of such a logical pattern is generally referred to as a model. The use of engineering methodology and the application of mathematics in the construction of such models makes it possible to use electronic computers to arrive at solutions to many business problems which currently must be solved intuitively. Many models have been designed which can be used to simulate a system or an operation. By simulation, it is possible to subject a system to a controlled change in any one of the factors involved and to measure the effect of such a change in advance of making a management decision. This approach is not exactly new but under manual methods, scientific management is quite often not feasible because of the impracticability of solving such problems within reasonable time limits. Equipment operating at electronic speeds, however,

opens the door to advancement in the use of these techniques.

What motives are influencing management to spend considerable time, effort and money in research to determine whether scientific techniques can be applied to the solution of their business problems? The prime motive, of course, is the potentiality of increased profits through the selection of the best of innumerable alternatives. This is known as optimizing which usually has the possibility of a very substantial payoff. I must say, however, at this point that most problems are so complex and so many of the criteria are diametrically opposed to each other that in a substantial number of cases, management must settle for sub-optimization or, in other words, less than the greatest possible savings. For example, in problems involving the optimization of production schedules, the basic objective might be to minimize total cost. However, a scientific solution to this problem might create a labor relations problem if it created a highly variable labor demand. Therefore, it is necessary to inject a criteria whose objective is to level employment. This is only one of many instances where such judgment criteria must be injected.

Time will not permit an extensive discussion of Applied Management Sciences, but I would like to give you just a few examples of types of applications which have been developed to date. Some of the more important applications with which I have had some experience are:

1. Production scheduling
2. Inventory optimization
3. Distribution of products at optimized cost
4. Direction of marketing activities
5. Optimizing profits through budgeting
6. Forecasting
7. Optimizing Portfolios.

At this time, I think it might be well for us to consider briefly management's responsibility in the development of scientific management techniques and the application of electronic computers to business. I believe that management's first responsibility is to learn. Increased knowledge of how scientific techniques can be applied to the solution of business problems and how electronic data processing systems can automate much clerical and administrative work is a prime responsibility. This entails the acquiring of basic knowledge about these techniques and about how computers work. The second responsibility of management, in my opinion, is to avoid costly mistakes in the development of their company's program. There has been justification for the errors and mistakes made by the pioneers in this field since they were sailing uncharted waters. However, even though the technical experience in this field is still limited, much has been learned from experience and every executive should avail himself of the knowledge gained to avoid repeating mistakes made by others in the past. Each executive has an overriding responsibility to do whatever he can to realize for his company any benefits which can be derived from new techniques. If these responsibilities are assumed and the implied challenge accepted, then I might suggest that there are two things which executives can do.

First, top management should undertake a self-education program. Experience up to the present time indicates that top management has little "know-how" in this field and understandably so. The tremendous pressure under which each executive must work from day to day has necessitated the delegation of the responsibility to acquire this knowledge to subordinates. This, however, is proving inadequate and executives must devote time to study and investigation in the fields of EDP and Applied Management Sciences.

Secondly, greater emphasis must be placed on education of subordinates. A great majority of technicians in this field have been drawn from company personnel and have been given programming courses by manufacturers. These courses, running from three or four to ten or twelve weeks often represent the total training program. This amount of training is grossly inadequate for the task facing these technicians and for the most part they must learn the hard way, by working on actual problems. Unfortunately, education in the field of systems engineering is either unavailable or too slow and on-the-job experience, which admittedly is the best learning method, is after the fact. The solution of most management problems require understanding and considerable active support of all executives. Their subordinates are entitled to the benefits of the long years of experience of these executives. I know that I am presenting a formidable problem to top executives, but perhaps if this problem is faced squarely, greater strides forward can be anticipated.

In conclusion I might make a very small contribution by summarizing some of the objective observations we have made stemming from the experience of our central EDP and Applied Management Sciences Staff in this field.

First, the price of inadequate planning by many companies has been very high. This we believe stems from a lack of understanding by top management of what they are plunging their organization into when they embark upon an EDP program. Adequate planning in advance will do much to decrease the cost of implementing the program.

Second, there have been many cases of bad equipment evaluation. Executives should realize that acquiring a computing system is entirely different than buying a book-keeping machine. Many manufacturers offer ingeniously designed electronic devices but the responsibility of selecting the proper equipment rests with company management, since this obviously cannot be expected of representatives of any equipment manufacturer. Proper advance planning and proper surveys should clearly disclose the equipment characteristics required. This makes it a relatively simple job to select the proper equipment to do the job.

Third, many company managements adopt a too narrow viewpoint. Potentials of presently available equipment are great. The realization of benefits which can be obtained by the use of such equipment requires progressive thinking devoid of hampering restrictions arising from present concepts and methods.

Long range thinking and planning will yield great benefits and the lack of such long range thinking and planning may place your company at a competitive disadvantage at such time as other companies begin to realize the benefits to be derived from a high degree of Scientific Management.

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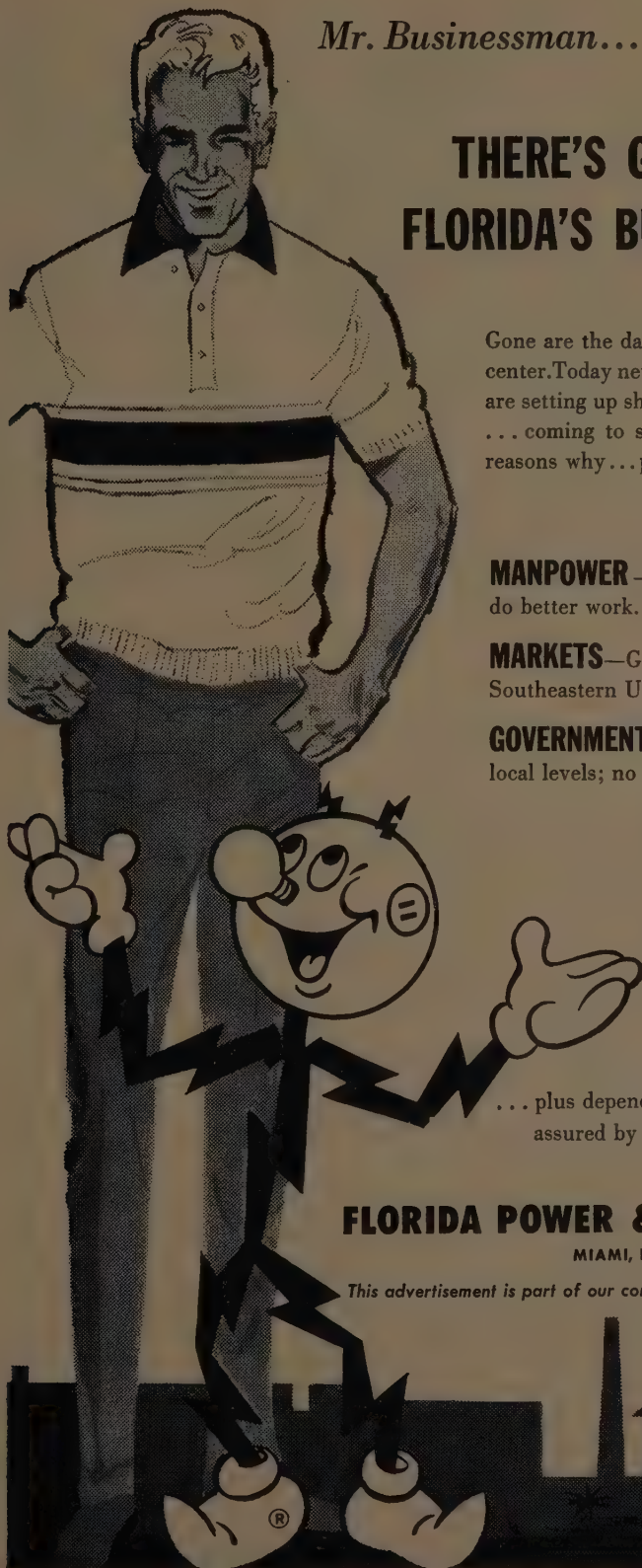
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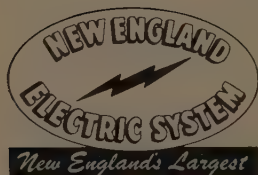


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NEW ENGLAND ELECTRIC SYSTEM

GAS AND ELECTRIC UTILITIES

Prospects for Electric Utility Companies on Pacific Coast

JAMES F. DAVENPORT

Executive Vice President, Southern California Edison Co.

JUST AS THE WEST is a land of contrasts, so is the electric utility operation here. Contrast the operation of Pacific Gas & Electric with over \$2 billion in plant, to that of the California-Pacific Utilities, whose plant account totals less than 1% of that amount. In the north, electric utilities rely to a major extent upon hydro resources, while in the south, the generation is based, to a considerable degree, on fuel.

One thing each utility in the west has shared in common, however, is growth—growth in customers, in sales, in plant capacity, in miles of line. The total plant investment of western utilities; which extend roughly from Canada on the north to and including Arizona on the south, rose approximately four billion dollars since 1945, an increase of more than 200%. The number and complexity of problems has grown, too. An understanding of the character of the problems that growth has produced is far more important than a complacent awareness of its benefits—of this I suspect the thoughtful analyst is well aware.

Perhaps the first, and possibly the least obvious, is the problem of effective manpower utilization. In the final analysis it is only through employment of the skills of people that the job of supplying electricity can be done. Increasing the labor force has compounded the difficulties of effective communication, and complicated the definition of areas of responsibility for line and staff. It has meant the development of entirely new concepts of administration, delegation of authority, and of control through standards, which change from year to year. What was satisfactory last year may well be unacceptable this year. It has meant, in short, that where once the job could be adequately handled through relatively few highly skilled managers, this is now impossible. It can be accomplished only through the direct efforts of many. This has involved training specialists in the painstaking art of learning management skills, and the sometimes unpleasant experience of reshuffling men who have failed to acquire these talents, who have not yet realized that advancement is only indirectly linked to longevity; that the personal ability of a manager is of maximum value only when it is reflected in, and multiplied by, the attitudes and accomplishments of his associates. Leadership and co-operative followership go hand in hand as all you people know who have to concern yourself principally with people, and not things.

I have called this manpower utilization problem, which has developed in the wake of growth, one of the least obvious because it is seldom immediately apparent in financial statements. It is not the sort of thing that can be pointed out with certainty as can regulatory lag, or rising fuel costs. But it is more critical on that account. It is surprising how few analysts are interested in this vital area. Its satisfactory solution must be forthcoming, if rapidly growing utilities are to provide an attractive medium for investment.

A second and more obvious problem, though it receives little attention in the utility press, is that associated with acquiring rights of way. This situation is linked directly to expanding populations and is a problem that grows by what it feeds on. The increasing number of customers, which makes the building of new lines necessary in the first place, adds to the difficulty of acquiring property along which the lines may be built. Many of the sparsely settled areas that transmission towers once could cross almost unnoticed have now been developed. As industrial, commercial, residential development has moved forward the problem has been compounded. Zoning ordinances have been enacted. And although the prideful owner of each new house will agree as to the vital necessity of electricity for his home or factory, still he can never quite agree that the indispensable line should be built near his property.

Costs of acquisition are affected adversely in at least three ways. Let me illustrate:

First, we seldom meet a willing seller. Anything but bargain prices must be paid for the property or the right to cross it. After all, utilities all over the country have been fair game ever since the first cattle baron sold out to the railroad. Although condemnation proceedings are available to us, community relations dictate that they be used only as a court of last resort.

Second, in order to avoid lengthy delays in obtaining possession, and because of zoning requirements, and in the interest of community relations, the shortest transmission distance between two points may not always be a straight line. I am not dealing in mathematics here. I mean simply that circumstances may require the line to be built around the developed areas rather than through them. Over a period of time, maintenance costs will be higher and transmission losses will be greater.

A *third* effect of this particular problem lies in the fact

that when populated areas are avoided, the territory through which the lines are built tends to become less readily accessible by road. Frequently on this coast it involves building lines across rugged, mountainous terrain. This can be expensive. To minimize costs of construction, particularly the building of access roads, interesting and somewhat sensational experiments are now being conducted in air-borne transportation of materials. We have recently set towers and poles and strung transmission conductors by helicopter, providing the answer to a construction man's prayer by providing "Sky Hooks."

AIR POLLUTION PROBLEM

Another problem, resulting from population increases, is not evident in financial statements. It is the problem of air pollution and its relation to the electric industry. As yet this is not so generally applicable to operations throughout the Pacific Coast area as it is to Southern California and the Los Angeles basin. I prophesy that as time goes on it will become increasingly prominent, nationally. Here in Los Angeles it has, in the last few years, been painfully in the public eye. (If you will pardon the pun.)

Electric generating steam stations are not principal malefactors in the creation of air pollutants. Air pollution is caused by people. The fact is that in any urban area thousands of inhabitants, through their human activities, will create tons of air contaminants. Investigation has indicated that the solution to the smog problem depends much more upon controlling the automobile exhaust than it does on any one other factor. Utilities, as responsible members of their communities, vitally interested in community welfare, will earnestly seek to minimize their contribution to the problem occasioned by their own facilities, no matter how fractional it may be.

Moreover, with increasing demands to be met, and with most of the economically feasible hydro sites, particularly in California, already developed, it is inevitable that an increasing number of steam stations will be built. The problem should be solved now. It can only be magnified by delay.

Extensive research has been jointly undertaken by utilities in this West Coast area to determine better means of minimizing air pollution from steam stations. A joint research council has been organized on which a number of utilities and air pollution control districts in the Los Angeles basin are represented. The council meet regularly and are constantly exchanging information, pooling data and cooperating fully. Although combustion in steam plant boilers is as complete as engineering science knows how to make it, it is known that the combustion of fuel oil produces some pollutants, such as ash, oxides of sulphur and oxides of nitrogen. Presently, no practicable means of removing either the pollutants from the fuel before it is burned, or from their combustion products, has been found. However, research has indicated that it is possible to materially reduce the small amount of ash and some of the sulphur oxide through the use of electrostatic precipitators. Experiments are also going forward in spite of negative results to date in chemical treatment of the oil to determine whether elimination of the sulphur is possible. Certain

means of reducing the formation of nitrogen oxides have also been found.

This brings up still another problem facing West Coast utilities with appreciable amounts of steam generation, namely, the problem of adequate fuel supply. The problem is especially acute in those areas where air pollutants must be minimized. I am led to discuss the matter solely because it has only recently become of any consequence here in the West, where traditionally ample hydro resources were available for meeting electric demands.

In the United States, three fuels are in general power plant use, namely, coal, oil and natural gas. From the availability standpoint, the supply of coal would be ample. There are nearby resources in Utah, Colorado and New Mexico. These could supply all requirements of the West for the foreseeable future. Obviously, however, coal of any kind cannot be used without aggravating air pollution in critical areas.

Historically, California's oil industry has supplied most of the demands in the western area for fuel oil. The influx of people to the Pacific Coast, with the consequent increase in demand, has outpaced the petroleum industry's ability to develop supplies equal to the requirements. Since 1949, California has had to import oil in rapidly increasing amounts. Adequate supplies are doubtless available from Venezuela, and the eastern hemisphere. But of paramount importance to the electric industry is the question of continuity of supply. Supplies of imported oil are susceptible to interference either through the outbreak of actual warfare, the whim of foreign governments, the curtailment of imports by our own Government through regulation and even the activities of labor unions through maritime strikes. For these reasons oil is not an entirely satisfactory fuel on which to base exclusive and long-term reliance so far as the electric utility industry is concerned.

For the time being, therefore, it seems to me that firm supplies of natural gas offer the best basis for answering the fuel supply problem here in the West. I am extremely hopeful Mr. Hornby's comments will prove optimistic in this regard.

NUCLEAR ENERGY MAY PROVIDE SOLUTION

Given time, nuclear energy may provide a solution to the fuel supply situation here. The problem is one of improving, through study and experience, generation of electric energy from atomic heat until it can become reliable and economically competitive. While progress in atomic research is proceeding satisfactorily, there is no way of actually determining how soon generation of electric energy from atomic heat will be economically feasible, until more prototype plants are built and some third or fourth generation full-scale atomic plants have been operated over an extended period of time.

In connection with the development of economic atomic energy, we in Southern California Edison Company believe that (1) private industry should carry on a substantial part of the research and development program on nuclear power facilities for the production of electric power. (2) That it is not necessary for the Government to enter into any program on a "crash" basis for the construction of

large-scale demonstration reactors with the taxpayers' money. (3) That the interest and activity of investor-owned electric utility companies, and the commitments already made by such companies, in the nuclear power program, clearly indicate the willingness and ability of the investor-owned electric industry to undertake 'a major responsibility for the commercial development by private capital of nuclear power facilities. There is ample time to make progress in an orderly manner.

NONTAXPAYING COMPETITORS

An ever-constant problem for West Coast electric companies is that of competition with nontaxpaying utilities, of which there are many. It is a serious handicap, something like that our renowned California colt, Silky Sullivan, must surmount each time he races. Silky usually must overcome something like a 25-length handicap and we in the investor-owned utility field must overcome a 25 cents (per revenue dollar) tax handicap. This handicap simply means that we must be that much more alert to operating efficiencies if we are successfully to compete with these nontaxpaying agencies.

I have by no means exhausted the list of problems West Coast utilities are encountering largely as a result of their rapid growth. The financial problem is certainly a major one, but I leave that field to Mr. Stathas. He is an able and highly respected financial expert. The necessity for expanding operations in the face of rising prices on the one hand and serious regulatory lag on the other certainly constitutes a problem of major proportions. But this, too, I intend to leave to him.

What I have attempted to do is put before you some of the problems we, and other utilities here, are facing in our daily operation. I have deliberately sought to avoid reciting the matters you may find in your examinations of financial statements and widely circulated statistical compilations.

I would be remiss were I to leave you with the thought that growth has brought *only* problems. It has also been beneficial to West Coast utilities. Industry, highly diversified in character, has become significant, and the influx of people has brought a high degree of commercial activity. With our great diversity of industrial and commercial enterprises, we know find ourselves tied much more closely to economic changes and developments than we were in years past. (We must look both closely and with perspective at what is occurring to the national economy in evaluating the prospect for West Coast electric companies.)

The current recession has, of course, slowed the upward thrust of the western economy. To say otherwise would be to indulge in wishful thinking. The impact of the downturn on the Pacific Coast has not generally been severe. But this does not mean that, should the recession deepen, we would escape additional trouble. Our problems are, essentially, a composite of those of our customers. To ana-

lyze this situation, it is perhaps best to take a careful look at the larger industries we serve and evaluate their financial future. They, their employees and their suppliers are also our customers as well.

The steel industry has had a definite decrease in production. Fortunately for the West, the downturn in steel, although certainly not of minor consequence, is not causing as severe a strain to our economy as it is in some other sections of the nation. A favorable factor for West Coast steel is the market it serves. Our steel plants are not as dependent on the automobile industry as are some steel companies operating in the Midwest and East. They sell most of their product to the various segments of the construction industry. Nearly one-fourth of the construction backlog of the nation is centered on the West Coast and it is very unlikely we shall see any further reduction in this field unless and until economic conditions take a decided turn for the worse. The vast array of military projects, highways, and commercial enterprises should continue to keep the construction industry on solid footing.

When we speak of the construction industry as being in relatively good condition, we must qualify it with respect to lumber. It has definitely reflected the decrease in home construction. But we do have some recent indications that a slight upturn in home construction is in the offing. Certainly over the long term it is inevitable that housing and building generally will resume an upward course.

Two of the most important industries to southern California are aircraft and electronics. Although employment in aircraft is down, the electronic component and missiles work have taken up some of the slack and it is generally believed the future holds great promise for them. The West has built up a vast and complex array of firms dealing with the new missile age, and it is expected that their growth will tend to offset any decline in the conventional military airframe industry.

CONCLUSION

In conclusion, I should like to point out that while our continuing growth brings great opportunities, growth in itself is not necessarily beneficial. For with this expansion in sales, revenues, customers and plant come the problems I have mentioned—and many others with them. Only through finding the proper solutions to these problems can growth be translated to corporate strength and higher earnings per share. That, I believe, is the job of utility management.

One capable utility analyst recently cited lethargic management as one of the great risks to ownership of utility securities. The economic problems we are experiencing here in the West are stimulating to management. It will keep us alert, resolute and forward looking.

Our industry has solved problems before, difficult and intricate problems, and I have every confidence that it can do so again.

Energy Requirements and Regulations

ROBERT A. HORNBY

President, Pacific Lighting Corp.

THE WHOLE PROBLEM of utilization of energy is geared to the worldwide drive toward industrialization, which in turn is necessary to bring the standards of living to levels that enable not only those of us in the United States, but we hope elsewhere, to lead reasonably healthy and satisfactory lives. We are told that if we are given adequate supplies of energy, almost any material in the earth's crust, including rocks, can be converted into usable resources for the world's peoples. To produce this energy and to process the basic materials, we need brainpower to provide the techniques and of course money with which to train the brainpower and develop the energy processes.

The role of engineers and scientists has been given much emphasis in recent months. One of our top executives recently gave a talk in which he pointed out that in 1900 there were about 1,800 persons in the United States for each working scientist or engineer. In 1950 the ratio was about 300 persons to one scientist or engineer. He says that by 1980 we will need perhaps twice as many engineers and scientists, and by the year 2000 about three times the present amount. That subject is a large one and I will pass over it to what I believe to be the cause of these energy demands—population.

POPULATION FORECASTS

We must look much further ahead as to the numbers of future customers. There was a time when a three-year forecast sufficed. Now we are trying to make reliable forecasts to the year 1975. By 1975 it is estimated that the increase in population will be 35.9% for the United States—91% for California—93.7% for Arizona and 96.4% for Nevada.

The job for us in the utility industry, and particularly in the gas industry, is to try to keep ahead of the energy needs of this explosive and constantly increasing population growth. As some of you may be aware, the West Coast in general, and California in particular, has no commercial coal. California is presently an importer of oil, and about 70% of its natural gas supplies must be brought in from distant out-of-state sources. As for Arizona, Nevada, Oregon, Washington and Idaho, they have been getting all their gas from out-of-state. In California we depend on natural gas and fuel oil to meet our thermal energy requirements, with oil supplying about one-third and natural gas about two-thirds of the thermal energy required.

Although nuclear power is not expected to make a large contribution to California's total energy supply by 1975, it is indeed fortunate that the use of nuclear energy for power development is now in prospect. We shall need all sources of energy to meet the great demands ahead. However, it is also clear that more and more gas and oil must be brought to the energy hungry Pacific Coast.

Where will the natural gas come from? Let us examine

the map of major transmission pipelines in the United States. (*See next page.*)

PROSPECTIVE TRANSMISSION LINES

The Twin Falls pipeline is a new transmission pipeline to be constructed by the El Paso Natural Gas Company and will deliver amounts now under a letter of intent totaling 400 M³cf per day over the next four years.

Transwestern Pipeline Company is a new company, not connected with the El Paso Natural Gas Company, which is scheduled to deliver 350 M³cf per day over the next four years to the California border to the Pacific Lighting Gas Supply Company, a subsidiary of our corporation. The installation of these projects depends, of course, upon obtaining the essential approvals of Federal and State regulatory bodies.

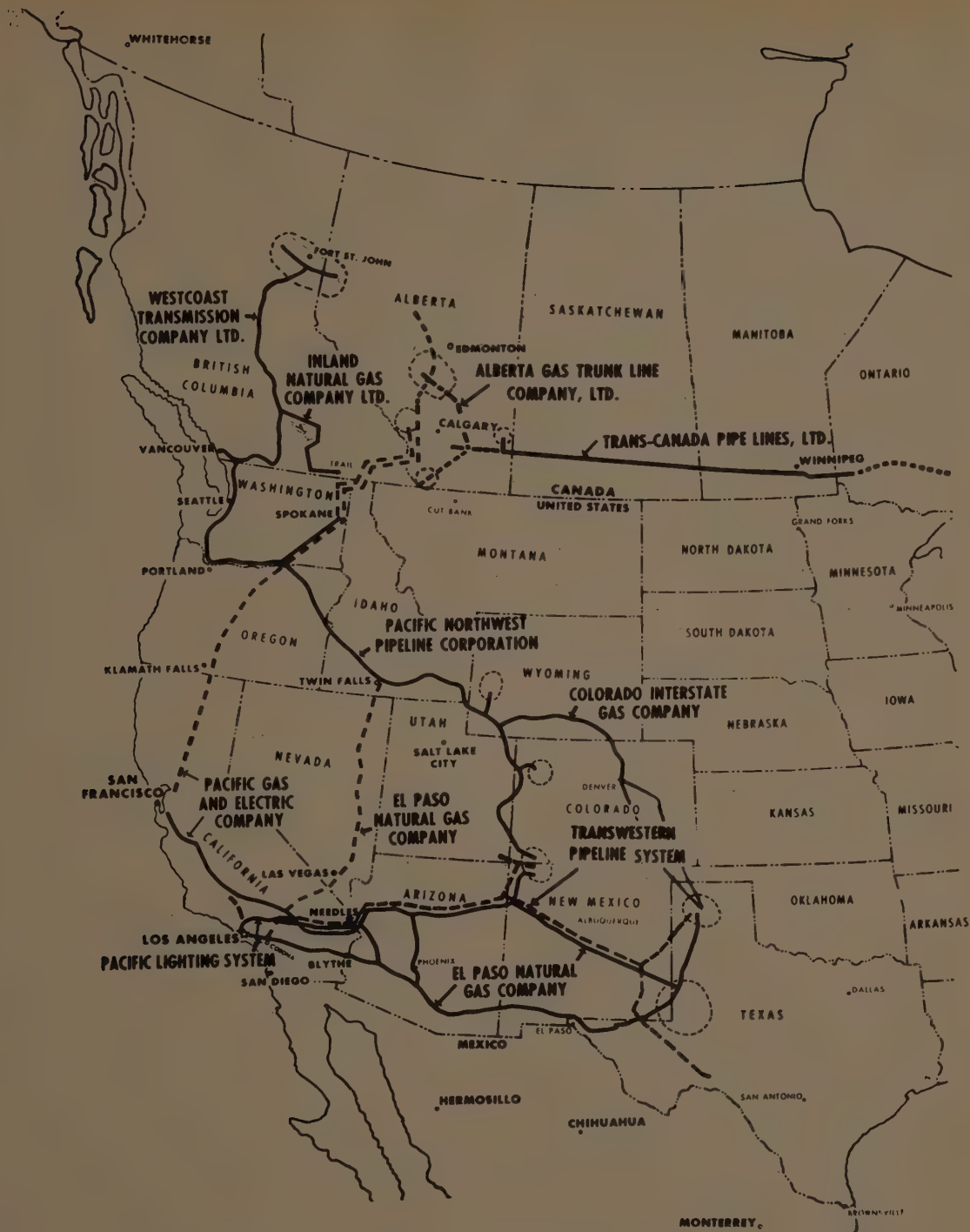
The Twin Falls line will tie to Canadian sources from which some part of the 400 M³cf is scheduled to originate. Here, again, importations of additional Canadian gas depend upon approvals of regulatory bodies in Canada as well as in the United States.

The long-term commitments necessary for a payout on these sizable projects, some running into hundreds of millions of dollars, become obligations of all of us in the gas business. As in the past, these lines can be laid from funds raised from the investing public, provided that the pipeline and utility companies involved are allowed to earn a fair rate of return, not just in a percentage relation on some rate making thesis, but in an adequate amount of dollars of net income. Fortunately, some recent decisions of the California Public Utilities Commission show concern for the great demands upon the utility systems and the long-range public welfare involved in meeting these energy demands. They also show courage in permitting the earnings necessary to establish the credit with which to undertake these projects. I am certain you are familiar with those decisions and the recent improved standing of California utilities in the eyes of the investing public.

FUTURE SOURCES OF THERMAL ENERGY

Now let us turn to a little longer view of the future and where we might look for additional sources of thermal energy. It is interesting that in 1925, when those of us who were first concerned about adequate natural gas supplies looked at our total reserves, they were estimated at 23 trillion cu. ft., of which one trillion was currently being used in that year. Thirty-one years later the estimated reserves total 237.8 trillion cu. ft., with about 10 trillion being used during the year. The ratio in both 1925 and 1956 is about 23 to 1. In 1957 the usage stepped up to 11.5 trillion cu. ft., but an increase in net reserves, the largest in several years, was 8.8 trillion cu. ft.

These figures, of course, do not include Canadian re-



Major Gas Transmission Lines in Western United States and Canada

Solid lines — existing pipelines
 Broken lines — Twin Falls connections
 Broken line — Transwestern system

serves, which have been estimated by the Alberta Conservation Board potentially to be about 75 trillion cu. ft., and by some geologists of the oil companies operating in Alberta, at 134 trillion cu. ft. by 1972. The potential for Alberta and British Columbia services is much higher for the long-term future.

If we look even further into the distant future as to the source of thermal energy, we see some predictions as to the prominent role to be played by fluid fuels. For example, Dr. Lawrence Hafstad, a nuclear physicist, in his book "Uses of Atomic Radiation and Energy" shows clearly the consumer awareness of the significant advantages of fluid fuels and the advantages of energy in this form. It can be distributed and stored at minimum cost. It is clean and does not require to be stored on the user's premises. The method of distribution to the customer's point of use is economical. Dr. Hafstad predicts a remarkable upsurge in these fuels sourcing from coal and oil shales. Starting in the late 1960's from zero, he thinks that by 1980 they will be equivalent to 30 trillion cu. ft. He suggests that by the year 2000 fluid fuels may constitute as much as 75% of the energy used in this country.

Dr. Martin Elliott, director of the Institute of Gas Technology in Chicago, an institution which our companies helped organize before World War II and of which I am a trustee, recently made a remarkably clear talk on this subject of future sources of energy. He uses some astronomical figures in reducing the potentials to BTU's and he draws the final conclusion: "Thus, even if all of our energy requirements for the rest of this century are assumed to come from fluid fuels, we will still have 60% of our economically recoverable reserves of fossil fuels left in the year 2000."

Although oil shale has been the unsung hero of our fossil fuel reserves, the Institute of Gas Technology has had under way a basic study for the production of high BTU gas directly from oil shale as it is mined without first retorting the shale to produce shale oil. The progress is quite encouraging.

After further discussion of the state of the art of producing gas from coal, either from synthesis gas or from reacting coal directly with hydrogen, Dr. Elliott concludes: "There are excellent reasons for believing that these developments will culminate in more efficient, more versatile, and less costly processes for the conversion of coal into high BTU gas. We can only conclude from the foregoing that when the time comes the gas industry will have available to it several methods for producing high BTU gas from coal at prices that will permit maintenance of its then competitive position."

Dr. Elliott properly admonishes my industry that it must not just pay lip service to research. I can assure you gentlemen that there is no lack of awareness of the need for this research and I believe that we are implementing it with our monetary support, which is on an industry-wide basis.

In concluding this portion of my talk, I recall to your mind the course of the existing and proposed gas transmission pipelines, and remind you that there are vast de-

posits of coal in Utah, Wyoming, New Mexico and adjoining states.

Now let us turn to a not so bullish topic, the Memphis Decision, the nation-wide legal smog hanging over the gas industry.

THE MEMPHIS DECISION — WHAT NOW?

My second topic is the Memphis Decision—What Now?

In this part of the direct presentation, be assured that I will not recite the text of the Memphis Decision. I am certain you are well aware of these, or at least their general nature. No doubt you also have seen legal reviews, newspaper articles, the flood of trade journal comments and official pronouncements on this unhappy decision.

However, I did re-read the decision, discuss the written and oral reviews of counsel, read the entire interrogation of Chairman Kuykendall and associates by the House Committee on Appropriations, statements in annual reports of several pipeline companies, and other current material.

When I tried to brief all this material, I found that I was in the frame of mind of the little boy whose doting grandmother had given him a book on penguins. When she asked her grandson if he had enjoyed reading the book, his reply was: "I liked the book very much, Grandmother, but now I know more about penguins than I wanted to know."

What is the Memphis Decision?

As you will recall, what has come to be known as the "Memphis Decision" arose from a rate dispute between United Gas Pipeline Company and one of its customers. However, it did not arise full blown from that particular dispute but evolved as an aftermath of the Supreme Court's prior decision in the Mobile Case.

The lawyers say that hard cases make bad law, and the Mobile Case was one of those. Mobile had a specific contract for the cement company providing for a specific price of about 10.7c per Mcf. The specific rate between United and Mobile had been filed with and accepted by the F.P.C.

In 1953, while United's specific 10.7c contract still had three years to run, United sought to file a unilateral rate increase with the F.P.C. increasing the 10.7c to 14.5c per Mcf. The F.P.C. permitted the rate increase to be made effective, saying that "contract rights must yield to the public welfare." The Third Circuit Court in Philadelphia reversed the rate decision, and in February 1956 the Supreme Court affirmed the Circuit Court's reversal, stating the Natural Gas Act "evinces no purpose to abrogate private rate contracts as such" and "the Act expressly recognizes rates to particular customers by individual contracts."

Since in the natural gas field only a few pipelines sold gas pursuant to long-term specific rate contracts, the Mobile Decision, while surprising, did not have very widespread impact. Most natural gas sold by the long-distance natural gas transmission companies had been sold according to F.P.C. tariffs which provided for superseding rate schedules. Nevertheless, the Mobile Decision had set the stage for the Memphis Decision.

In 1955 United Gas had increased its rates for sales to Texas Gas Transmission Company, who in turn sold to Memphis Light, Gas and Water Division of the City of

Memphis. The City of Memphis immediately protested the increase, citing the Mobile Decision.

The City argued that the purpose of the Natural Gas Act was to uphold contracts rather than break them. Hence, rate increases were only proposals which the F.P.C. could accept for filing if the customers of the pipeline companies specifically agreed to such a filing. The F.P.C. strongly resisted such an argument. The Court of Appeals, however, gave scant heed to the F.P.C. arguments.

The effect of the Court's decision was to set aside the increase in rates which had theretofore been made under Section 4 of the Natural Gas Act—unless consents had been obtained from all of the customers affected by such increases. The Court directed the F.P.C. "to reject the schedules filed by United Gas and to initiate such proceedings as may be necessary to secure refunds of the incremental amounts paid to United since the time that those schedules were erroneously allowed to become effective."

THE LEGAL AFTERMATH OF MEMPHIS

It soon became known throughout the gas industry that most pipeline company tariffs were in jeopardy under this decision.

The F.P.C. proceeded immediately with its petition for a Writ of Certiorari with the United States Supreme Court. The Solicitor General's petition stated that the Court of Appeals' decision was an unwarranted expansion of the Mobile Decision and that it upset the F.P.C.'s and the industry's long-standing construction of Section 4 of the Natural Gas Act, and the general use of service-agreements-plus-tariffs of the type involved in the instant case. It certainly did. It further pointed out the undoing of the years of work in the rate review field, the intolerable burden upon the Commission (of Section 5 proceedings). It called attention to the resulting damage to the gas industry, including impairment of the financial ability of the companies affected. Others joined with the F.P.C. in urging review and a prompt decision. It now appears that the case will be argued in the fall of 1958, with the highest court's decision probably in early 1959.

In the meantime, some pipeline companies have been trying to meet what they have interpreted as the dicta of the Memphis mishmash.

The gas industry can move ahead on two fronts—judicial and executive. Moves on the legislative front must be held in abeyance pending the decision of the Supreme Court of the United States. As to the judicial front, unquestionably the case will be extensively argued when the Court reconvenes in the Fall, and it is being predicted that a decision will not be given until next Spring. On the executive front, it would appear from statements in pipeline companies' annual reports that there are many doubts as to whether existing sales contracts of the pipeline companies are adversely affected.

Here are a few questions which my review leaves unanswered:

1. Is there actually any section under the Natural Gas Act in which a pipeline company can request a rate increase and expect to be heard?

2. The regulatory lag is now six months under Section

4 proceedings. What will it become if the F.P.C. finally concludes that pipeline companies can file and expect to be heard under Section 5?

3. What might be the position of a politically unsympathetic Commission?

4. Will those pipeline companies which heretofore have used their best efforts in seeking out new gas supplies for their customers continue to do so, since they are not compelled to do so?

5. If the Supreme Court sustains the Circuit Court, what are the prospects of corrective legislation?

6. Will state public utilities commissions, municipalities and attorney generals support such corrective legislation?

7. If the Supreme Court sustains the Circuit Court and corrective legislation cannot be passed, can pipeline companies then satisfactorily negotiate with their customers, with state regulatory bodies looking over the customers' shoulders?

8. Will the inherent imagination and vigor of American industry overcome the hurdles?

Some of the questions suggest the answers. Perhaps you will be interested in exploring some of them later.

CONCLUSION

Since I appear as an officer of companies who are customers of pipeline companies, it may occur to some that I should view the Memphis Decision as just an unfortunate situation for our suppliers. At the time of the Harris Bill there were those who thought that we should either be in opposition to the bill or we should stand aside. Our view of the matter was the opposite and we actually supported the bill and hoped that, although it was not perfect, it would become law.

However, we too thought spiral escalation of rates arising from favored nation clauses in gas purchase contracts were unsound. They were creating a built-in inflation not caused by the basic law of supply and demand. We also thought that if they were not restricted by producers and pipeline companies they would come under attack and corrective legislation. Nevertheless, when the bill was being debated in Congress we did not believe that was the forum in which to air the differences of position within the gas industry.

You will recall that some who opposed parts of the original Harris Bill enlisted civic and political allies. Too much of that testimony exhibited more acrimony than acumen. Also there had been circulated statements attributed to pipeline companies, which indicated indifference to the problems of the purchasing gas distributing companies and their customers. Also, there seemed to be evidence that information which might be considered damaging to one's opponents had been fed to Congressional representatives or the Justice Department. Thus, when the "black bag" incident occurred, it was easy to veto the original Harris Bill as the record contained strong opposition of civic bodies and dissension within the industry. Unfortunately, I think too many of the latter instances had been energized by prior bad relations between suppliers and purchasers.

It is my view that inviting members of the Judiciary or of Congress to resolve disputes within an industry is quite likely to be another case where the invited guest becomes "the man who came to dinner." In any event, whatever the rationale for the testimony and those actions, what transpired was certainly not industrial statesmanship. I believe the industry has learned a great deal from that situation.

Today I think there are but few customers of pipeline companies who view the Memphis Decision as some type

of windfall for the customers. On the contrary, I think they view it as an unfortunate set of hurdles in securing the compensation with which to produce and deliver the much needed future supplies of natural gas. Speaking for myself, I view this whole indecisive period as damaging to the best interests of the millions of customers now served and to be served by the gas distributing companies. Hence, I hope that the Supreme Court decision will clarify and not compound the problem.

Outlook for Electric and Gas Utility Industries

P. P. STATHAS

President, Duff & Phelps, Inc.

WE ARE NOW IN A PERIOD when the electric utility companies have an ample opportunity to demonstrate again their ability to maintain and increase earnings during a period of business recession. Since mid-summer of last year the FRB index of industrial production as you know, has declined from about 145 to a current level of about 126. For the first quarter of 1958 the steel industry operated at about 50% of capacity, the output of the automobile companies was at a similarly low level, unemployment was on the increase, and, in general, earnings in many industries were sharply reduced below the levels reported during the first quarter of 1957.

On the other hand, so far this year, the electric utility industry has met the test rather well. For the first 18 weeks of 1958, through May 3, the total net kilowatt-hour output of the electric utility industry as a whole was almost exactly the same as the total figure for the first 18 weeks of 1957 (213,333 million kwh. vs. 213,365 million kwh.) These statistics show that in ten of the 18 weeks this year there have been declines in the amount of electric energy output from the corresponding weeks a year earlier. However, these declines have been small and have ranged from 0.1% to 3.3%. Some sections of the country showed continuing increases while others showed declines. This, of course, reflects the effect of changes in sales to industry in general and to the Atomic Energy Commission and aluminum-magnesium plants particularly.

Thus, while the weekly electric output of the entire electric utility industry reflects the lowered pace of economic activity, any week-to-week declines have been moderate indeed in relationship to the declines in the FRB index of industrial production and other business indices.

Although there has been no gain in kilowatt-hour output, operating revenues are still showing satisfactory increases. The decline in industrial sales has been more than made up by gains in sales to the more profitable residential and commercial classes of service. Under typical rate schedules, a kilowatt-hour sold to a residential customer produces from two to three times as much revenue as a kilowatt hour sold

to an industrial customer. Also, the average realization per industrial kilowatt-hour sold tends to increase as the consumption at the bottom steps of the rate schedule declines. In the month of January, 1958, for example, the latest month for which detailed figures are available, total kilowatt-hour sales were only 1.6% higher than in January, 1957. Residential sales, however, were almost 10% higher, while sales to commercial customers were about 6½% higher. The decline was confined almost entirely to large light and power customers who are primarily industrial, and these sales declined about 5%.

In addition to the continuing increase in the more profitable residential and commercial business, the current increases in revenue of the electric industry reflect rate increases. During the past year a number of electric utility companies applied for rate increases and many companies had the benefit of higher rate schedules in the first quarter of this year as compared with the same quarter of 1957.

With respect to operating expenses, the companies this year are paying higher wages as compared to a year ago, and labor costs as a result are higher. Fuel costs, however, have tended to stabilize. As a matter of fact, in some areas there have been freight reductions on coal and also some suggestion of weakness here and there in coal prices. It is important to remember that for the typical utility company, fuel expense and labor each take about 20% of operating revenues, so the trend in these two items can have a considerable effect on earnings, although a part of the change in fuel expense is passed on to the large consumers through fuel adjustment clauses. Another thing to remember is that the companies are protected with minimum monthly charges with respect to sales to industrial consumers.

The operating results of the electric utility industry for the balance of 1958 will depend to some extent on the trend of general business conditions. With a leveling out of the general business trend, and perhaps a slight recovery during the last quarter of this year, we would expect that the gains registered in the first quarter will hold fairly well

for the entire year. In general, our studies point to the conclusion that the electric utility industry will again demonstrate its qualities of depression resistance and a high degree of stability of earning power.

Looking down the road a little farther, we feel that the long-term prospects of the electric utility industry continue to be good generally, but not without some problems. Our optimism is founded on the fact that the electric utilities are fundamentally blessed with a favorable cost curve, and the three important variables which affect a utility's costs of rendering service, namely, load factor, average consumption per customer, and customer density, are still going in the right direction in most cases. Average consumption per customer is particularly important. For example, when the average kilowatt-hour consumption per customer of a company operating at a given customer density and load factor goes up from 2,000 to, say, 4,000 kilowatt-hours, with other variables remaining the same, the corresponding cost per kilowatt-hour sold is reduced by more than 20%. However, if the average consumption increases still further, the drop in unit costs becomes smaller. It would therefore be advisable for certain utility companies to re-examine the lower steps of their rate schedules to make them more compensatory in line with the current costs of doing business. Similar reductions take place in unit costs as the load factor and customer density go up.

FUTURE GROWTH

In trying to visualize the growth over the next ten years, we should, of course, keep in mind that we are now in a low point in the cycle of family formations and probably it will not be until the early 1960's that we have any pick-up of consequence in this important economic factor. On the other hand, industry is likely to go to more and more mechanization in order to offset the increase in wage rates, and this will mean more consumption of electricity for industrial purposes. The decentralization of population to suburban areas is also likely to result in higher commercial sales. Taking all factors into account, it would seem that kilowatt-hour sales during the next ten years should still show substantial increases although probably at a somewhat slower rate than that experienced during the past ten years.

The electric utility industry will add about 16 million kilowatts of new generating capacity in 1958 and has scheduled another 13½ million for 1959. These are large additions, but with good reason. The prospects, however, are that many electric companies will face the next few years with plenty of capacity to sell. Such companies will have to place a premium on good loadbuilding programs not only to put into use the new generating capacity but also to maintain a profitable balance of loads. It is possible that the next few years may provide a good test for the managements of many electric companies and their sales organizations. The analyst should therefore be on the alert for unusual excess capacity that might in some cases temporarily dilute the per share earnings.

We feel that over the next five years the operating results of the well managed utility companies will be quite good. While the rate of growth in kilowatt-hour sales may be slightly lower than we have seen in recent years, this

may well be a favorable factor. As a matter of fact, many companies have been penalized by growth because the cost of building new plant and other facilities with which to meet this growth has exerted real pressure on the rate of return and diluted the gain in the per share earnings by the requirements for sale of new shares. A more moderate rate of growth for some of these companies during the next few years could well result in better earnings in relation to capital invested and in more favorable growth in terms of per share earnings. The industry as a whole has maintained a well-balanced and sound capital structure which enables it to finance its future requirements without difficulty.

Regulatory developments during the past year have been encouraging. With the higher cost of money which prevailed during much of 1957, a number of commissions raised their sights on rate of return in order to meet this problem. I am glad to say that there has been considerable improvement in this respect here in the State of California. On the whole, the regulatory climate throughout the country has shown considerable improvement, except of course in a number of instances. This leads us to the conclusion that such companies as will require rate increases to offset higher investment and operating costs will be able to obtain reasonable treatment by the regulatory authorities who have, generally speaking, demonstrated an increasing willingness to recognize the industry's problems and granted reasonable assistance in enabling the utilities to go forward in providing high standards of service and continued growth in plant with which to meet the long-term increasing demand for electric utility service.

On the important question of how income taxes deferred because of accelerated depreciation should be treated for rate-making purposes, there have been both favorable and unfavorable decisions, from the investor's standpoint. During the past six months, a number of commissions have allowed normalization of deferred taxes. In some states, however, notably New York and California, the commissions have deferred any decision on this matter, although in both states the commissions have had ample opportunity to issue orders on this subject. A company which cannot normalize its income taxes for use of accelerated depreciation and is allowed only a 6% return on earnings reported on that basis is severely penalized in terms of real earning power as compared with a company which is permitted to normalize them. This penalty is cumulative and the longer it persists the worse the company is hurt. If a company is not permitted to normalize income taxes, perhaps it should not use accelerated depreciation for tax purposes. It is much better off using normal depreciation rates and having the full tax liability accepted as a deduction for rate-making purposes.

Perhaps there is some interest here in the developments in nuclear power reactors. At present there is just one commercial size unit in operation—the 60,000 kw. Shippingport unit in the Duquesne Lighting Company system. Other power reactors which are currently operating are the 5,000 kw. boiling water reactor at Argonne National Laboratory; the 5,000 kw. boiling water reactor of General Electric which is operated as a part of the Pacific Gas & Electric system; a 7,500 kw. sodium graphite reactor built by the

North American Aviation Company and operated as a part of the Southern California Edison system; and a 2,000 kw. pressurized water reactor at Ft. Belvoir, Virginia operated by the U. S. Army Corps of Engineers. These units are all in operation and are providing very valuable operating experience.

Thus far the operating experience of these nuclear plants has been reported to be quite encouraging. The units have operated smoothly with no unusual operating or maintenance problems. They have proved to be quite stable and capable of accepting load swings, and in some cases the thermal capacities have been greater than originally anticipated. However, experience with these units has been over a short period and they are by no means proven as yet.

We have seen cost figures on only two of these installations. On the Shippingport unit the estimated cost of electricity at the bus bar, including fixed charges, is about 6½¢ per kwh. and for the Argonne National Laboratory unit about 5¢ per kwh. These, of course, are extremely high costs compared to those obtained for conventional thermal plants.

You are, of course, familiar with the fact that there are now under construction several commercial size nuclear power plants scheduled for completion beginning in 1960, by various investor-owned companies, such as Consolidated Edison, Commonwealth Edison, the Yankee Atomic Electric Company in New England, Detroit Edison, and Pacific Gas and Electric, among others.

Although we are rapidly approaching the day of large-scale experience with commercial nuclear power plants, the operating costs and long-term performance are still in the realm of speculation. The important thing to remember is that our business-owned electric utility companies have taken the bit in their teeth and are spending substantial sums of investors' money to build and to learn about atomic energy as a source of heat for power generation. As you know, there is plenty of agitation in Congress for having the Government assume the major role in the development of atomic power. If the political ownership advocates have their way, this could mean the subsidizing of public power systems and the establishment of a number of minor league TVA's around the country based on nuclear power rather than hydro power. We hope that reason will prevail and that private industry will undertake this task rather than to burden the taxpayers still further. We also feel that the investor-owned utilities are to be commended for proceeding with the development of nuclear power in an orderly manner and with due consideration to the economics involved rather than to have the country engaged in a nuclear kilowatt race with other countries.

While nuclear plants in this country cannot now be justified on the basis of cold-blooded economics, it is well to proceed with research and development in an orderly fashion in order to obtain additional know-how and ultimately make them competitive with conventional plants. Incidentally, during my recent European trip, I observed that Italy is going ahead with three or four of these nuclear power plants, which, in that case, are economically justifiable because of the generally high cost of fuel and the lack of additional economical hydro sites. I understand that Italy will

shortly be calling for bids on these plants in the international market and I hope that our manufacturers get the business, although the British manufacturers, who are being aided by their Government, may prove to be very stiff competition.

THE GAS INDUSTRY

Let us now turn to the natural gas industry. From the standpoint of growth, the natural gas industry has perhaps been a little more dynamic during the postwar period than the electric utility industry, particularly when measured in terms of volume of the product sold. For example, in terms of therms of gas sold, the natural gas industry today is 2.8 times as large as it was ten years ago, while the electric industry is 2.6 times as large. In terms of customers, the natural gas industry is now 2½ times as large as it was ten years ago, while the electric industry is only about 1½ times as large as it was ten years ago. It should be noted, however, that in 1947 the electric utility industry had a much higher customer saturation than the natural gas industry, which was just really getting started in its push into new markets. The significant thing here is that, in spite of a lower rate of customer growth, the electric industry made almost as good progress volumewise during the past ten years, which means that during this period the electric industry was able to increase the average use per customer very substantially, while in the gas industry there has been very little growth in the average use by average consumer.

Forgetting for a moment the implications of the Memphis decision, one would say that the gas industry should be optimistic about its prospects for further growth. Estimates are that a million new customers will be added in each of the next nine years. The industry expects to spend about \$2 billion this year for construction as compared with \$2,200,000,000 in 1957. The construction budgets for the next two years aggregate \$4½ billion, indicating a slightly higher annual rate than that projected for 1958. Slightly more than half of this year's budget is for transmission expansion, about a fourth for distribution systems, and the balance for production, storage, and other items. It is encouraging to note, from the investor's standpoint, that the industry is spending more money for storage facilities, which is a good thing for more economical operation. The storage of gas during the summer months and the subsequent withdrawal for meeting the space heating requirements is, of course, an important offset to the otherwise uneconomical annual load factor of the space heating business.

In discussing the outlook for the natural gas industry, we must separate it into two segments, namely, the pipeline group and the distribution companies, respectively, because the conditions to which these two groups are subject differ in some respects.

The pipeline industry is confronted with some serious problems which stem from regulation, and I hope these problems will prove temporary. As you know, there are few pipelines which do not have at least one unsettled rate increase application before the Federal Power Commission. Several have as many as three unsettled rate increase applications before the FPC and are collecting rates subject to

refund reflecting all of these proposed rate increases. Consequently the reported earnings of these companies are contingent on final settlement of the rate cases, and for some companies this includes earnings going back several years. These are very unsatisfactory circumstances for analysts who have the job of appraising the true earning power of pipeline companies. At the latest report the FPC had more than 50 unsettled applications by pipelines for rate increases involving in the aggregate rate increases well over \$200,000,000 on an annual basis. In addition, the FPC had more than 1,200 unsettled applications for rate increases by independent gas producers. This state of affairs may be paradise for lawyers but certainly not for analysts.

The regulatory problem was further complicated by the so-called "Memphis" decision which was so excellently covered by Mr. Hornby. It would be repetitious for me to discuss it further.

REGULATION OF WELLHEAD PRICE

As you know, another problem is that of the regulation of the price of gas at the wellhead, which came about by the Phillips decision of the U. S. Supreme Court. You are familiar, of course, with the subsequent vicissitudes of the Harris Bill. Similar legislation is still pending but it has the appearance of being dead as far as this session of Congress is concerned. Whether it can be passed in another year is hard to say. It looks pretty much like a toss-up. The coal industry, which has previously been opposing such legislation, has offered to support the passage of the Harris Bill or similar legislation if there are included amendments or provisions designed to strengthen the position of the coal industry. These proposed amendments would subject all direct industrial business of the pipeline companies to Federal Power Commission regulation, whereas these sales are now exempt. The coal industry also wants a provision which would allocate against boiler fuel sales of gas a larger portion of the fixed charges of the pipelines than is presently allocated against this business. The objective, of course, is to force the price of boiler fuel up to a level where it cannot compete with coal, at least in some areas. These amendments, we understand, are opposed by the pipeline companies.

It seems that in the past the three segments of the natural gas industry, namely, the producers, the pipeliners, and the distributing companies, have been pulling in different directions, particularly in connection with the corrective legislation required to eliminate the problems imposed by the Phillips decision. Closer understandings and co-operation are certainly essential as far as the future overall progress of the natural gas industry is concerned. In the final analysis, their problems are fundamentally the same and the various segments must work closely together.

The competitive position of natural gas continues to be good in most areas. Even in New England, where the city gate rates are higher than in other sections of the country, natural gas is increasing its share of the market with new space heating loads being constantly added. However, in some areas the increasing prices being paid in the field for gas is pushing up the rate at which some companies are selling boiler fuel gas to a level where coal is competitive

or even has a price advantage. As time goes on, the average price paid by pipeline companies will probably reach a level where it will be uneconomical for most pipelines to try to sell gas for boiler fuel except in areas fairly close to gas production or in areas where alternate fuels are extremely high in price. This will put a premium on large underground storage capacity, as these storage facilities will permit these companies to operate with little or no need for boiler fuel sales during the summer, but this, of course, is quite some time away.

The reserve position of the natural gas industry remains about as it has for the past several years. Additions to the reserves continue to show increases a little larger than the annual withdrawals, with the net result that proven reserves at the end of each of the past several years have been equal to about 22 or 23 years' supply on the basis of current withdrawals.

Reported earnings of most of the pipeline companies continue to increase at a favorable rate without showing any effect of the current recession of business. For the 12 months ended January 1958, the latest period available, gas operating revenues were 13½% higher than for the preceding 12-month period, while operating income and net income showed similar increases of 10.3% and 6.7%, respectively.

Earnings as reported by individual pipeline companies for the first quarter of 1958 have been quite good, reflecting in part the very favorable heating season which affected most of the midwest, the south, and the east during this quarter. We would expect that sales and reported earnings of the pipeline companies for the balance of 1958 would compare quite favorably with 1957, but it should be remembered that such earnings in most cases will be contingent upon final settlement of rate cases.

The need for balancing seasonal loads is providing the basis for a real competitive battle between the gas and the electric utilities, with the former shooting at the air conditioning market to balance its space heating load and much of the electric industry shooting at the heating load to balance off its air conditioning load. We would expect both the electric and gas industries to shoot the works in an effort to build up these balancing loads. To the extent that these programs are successful, they could result in lower cost of service to the customer and improved earning power for the companies involved, which is the perfect objective of a utility company.

SUMMARY

We feel confident that the electric utility industry, during the current recession, will again prove its depression-resistant characteristics and a high degree of earning power. Barring a significant further decline in business activity, the electric utility industry should again show a good increase in net for Common in 1958.

The longer term outlook also appears to be favorable. Last year when interest rates became higher, many people felt that the utility Common stock earnings were going to be squeezed. The fact of the matter is, however, that such increase in interest rates is equivalent to only a few cents

per share. On the other hand, the higher rate of return which can be justified under such circumstances improves the per share earnings very materially.

With respect to the natural gas Commons, the impact of the regulatory problems of the industry on individual companies, of course, varies substantially. Pending further clarification of the over-all regulatory problems, the securities of the natural gas companies operating under the Natural Gas Act carry a degree of investment risk and market volatility not normally associated with public utility securities. Therefore a high degree of selectivity is required. Investment in this field at this time must be based not only on the operating and investment characteristics of the particular company but also the manner in which such characteristics and the position of the company with respect to current regulatory problems at the Federal level meet the investment needs and requirements and the risk-taking ability of particular investment accounts.

Natural gas distributing company Commons as a group have shown a relatively sharp increase in market price. This perhaps reflects the temporary advantage gained by distributing companies from the Memphis decision, and, in addition, most of these distributing companies had the

benefit of unusual increases in earnings as a result of much colder than normal weather during the first quarter of the current year. It is therefore important in reviewing stocks in this category that consideration be given to earning power derived under normal weather conditions rather than to currently reported earnings.

In addition to weather influences, earnings of the distributing companies can be importantly affected by the final outcome of the many rate increase cases of their supplier gas transmission companies which are open before the FPC and which can, of course, be affected by the outcome of the Memphis case. For the shorter term at least any slowing up of the progression toward higher natural gas prices at the city gate can well be to the advantage of the distributing companies. However, in the long run, these distributing companies have a continuing interest in adequate supplies of gas. They must get the gas one way or another if the growing demands of their customers are to be met.

In considering all factors, one perhaps would be justified in making the general statement that under present conditions properly selected electric utility Commons are better values than those obtained in the natural gas segment of the utility industry.

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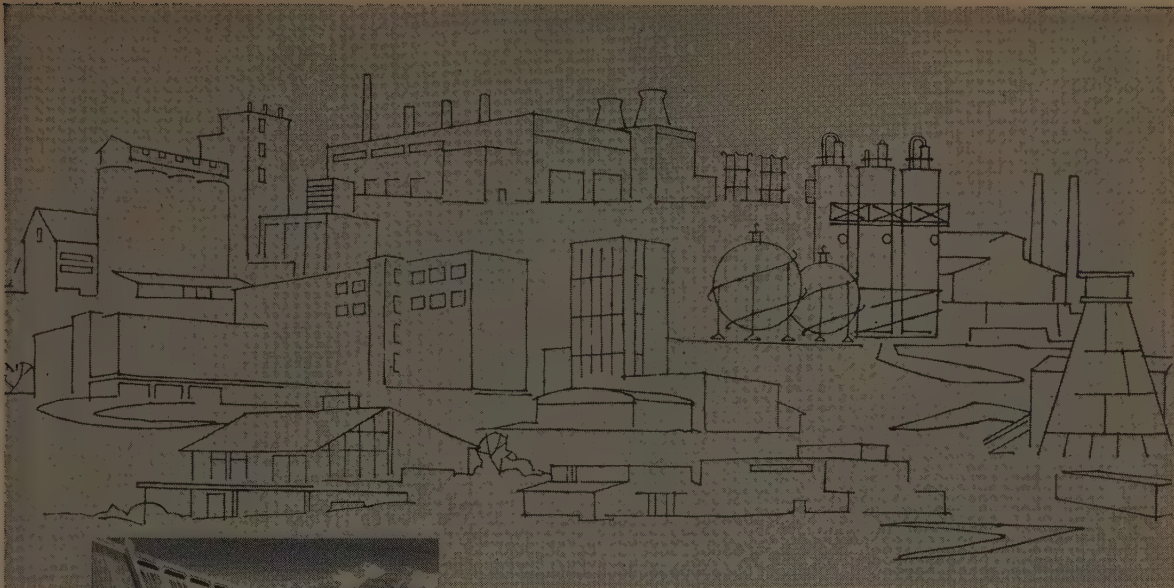
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QUICK FACTS—1957

	Amount	% Increase Over 1956
Net Income for		
Common Stock	\$ 5,945,997	9
Per Share of Common Stock	\$1.82	9
Per Cent of Operating Revenue	22.0	2
Dividends Paid per Share....	\$1.36	8
Operating Revenues	\$26,983,317	7
Gross Additions to Utility Plant	\$28,887,710	28
Kilowatt-hour Sales (in thousands)	2,243,080	8
Customers at End of Year....	200,059	4
Average Annual Kilowatt- hour Use Per Residential Customer	7,642	6

GROWTH: Population in Puget's area increased 74.2% in the 15 years ended 1955 and is forecast to rise by 60% in the period 1955-65. Puget's load growth is expected to continue upward, consistent with past performance.

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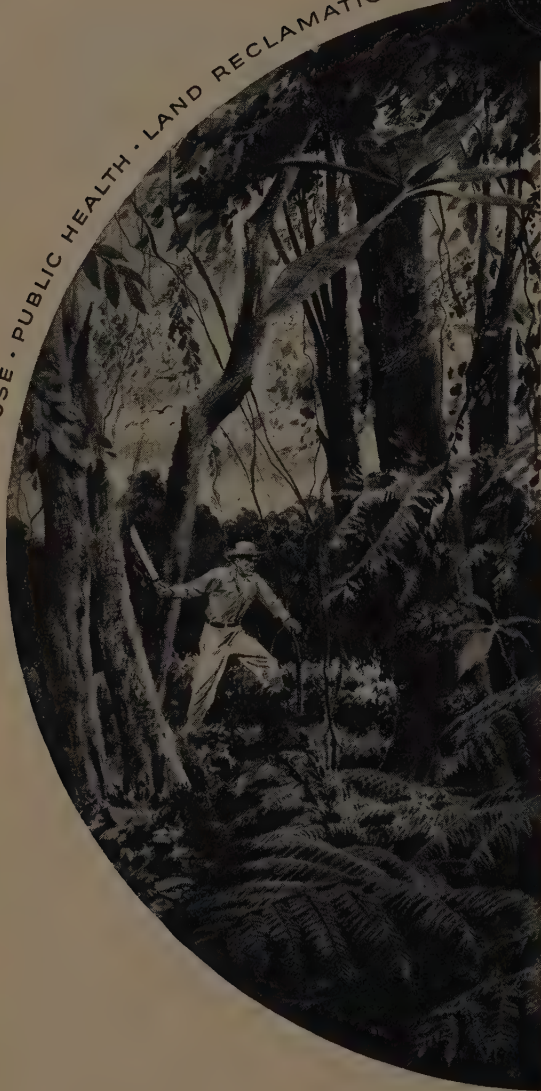
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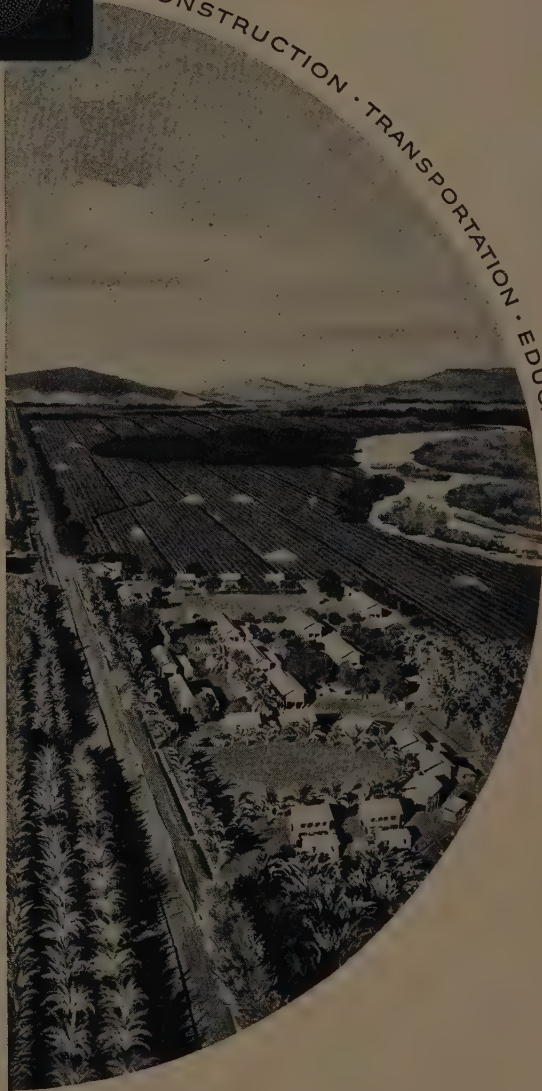
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ANNUAL DINNER

Exploring the Tomorrows

FRANK PACE, JR.

President, General Dynamics Corporation

THE SUBJECT "Exploring the Tomorrows" came to me in conversation with Krafft Ehrlicke, the brilliant scientist, who works on space programs at our Convair Division. He was in New York, visiting in my office, and I asked him two questions, both of which, I think, are pertinent to the future of this country.

The first was, "Krafft, I'd like to know, and I'd like to know honestly, because it's important to me, are you being allowed to exercise your full capabilities?"

One of the problems that we have in America, and particularly in American industry, is to use effectively these scientists—these tremendously able but quite different kind of men who are going to shape the future, not only of American industry, but of American civilization.

Krafft's answer was certainly satisfying to me. He said, "I have worked now for about four years on a space program. Three years ago when I came to Convair I had a program that was so forward looking I was afraid I'd be laughed at. But, to be perfectly frank, my program was expanded beyond what I had established."

As I thought of my talk to you tonight, one of the things that really stood out in my mind was the fact that it wasn't much more than a year ago that space programs were almost exclusively relegated to the funny papers. Yet, in a span of less than twelve months, space programs are thoroughly accepted and generally discussed, and the thought that a man may go to the moon is no longer strange to any ordinary American. It is a measure of the growth of our times that in so short a period we have accepted the fact that worlds other than ours not only exist, but are now within the grasp of men of this particular planet; and that the space world is now something that we talk about in everyday language.

My second question to Krafft Ehrlicke was this, "It's difficult for those of us who have not lived in this field to understand it in lay terms, so tell me, just exactly what are you doing?"

"Well," he said, "it's not really as complicated as one might think. The real problem in this business of space is to become familiar with it. If we spend three or four years travelling mentally in this area—if we traverse it in discussions, in plans, in programs and in theories—then we come to know it a little bit the way you know your house, or your automobile. We know its limitations, its dark

areas and its light areas. Then, all of a sudden, something that might have appeared very mysterious suddenly appears very plain. A great new idea is born and bursts on the world as some startling new thought. But great new thoughts generally come about because people have become quite familiar with a whole new area of ideas.

"I like to think of this process of getting familiar with new areas of ideas as *wandering in the tomorrows*," he said.

And so I thought that tonight I would wander a little bit in the tomorrows with you. It's important that all Americans wander a little bit in the tomorrows because this I think, is the key to our survival as a nation. That's a simple thought, a frightening thought, but true.

These tomorrows are the tomorrows that keep us up with, and ahead of, the Communist world that is dedicated to our destruction. Never in the history of man has any philosophy been more clearly, more explicitly, and more consistently laid out than that of the Communists. They want *their* way of life to survive. They do not feel that they can co-exist with us, so they are prepared, either slowly or quickly, whichever is the more feasible way, to find the means of our destruction. If ever they get a major area of advantage over us in a uniquely critical field, you may be sure that, either politically or militarily, they will take advantage of it. Therefore, it's important that in the area of "exploring the tomorrows" we of the free world, we men and women of free thought and free expression, know enough and apply ourselves enough to stay ahead.

In this process, we must not lose sight of the fact that there may be another and a bigger discovery to be made in exploring the tomorrows. This is the possibility that through such exploration we shall find a sound basis on which, once the Communist philosophy has passed from the face of the earth, men may live together in peace.

This progression of thoughts from literal scientific discoveries to social conduct is not something that just happens with scientists. It's part of our national philosophy and part of our national understanding. I don't think that we can talk about the tomorrows unless we likewise think and understand a little bit about the yesterdays and the todays.

We came into being as a nation of free men and individualists at a particularly fortunate time for us. The era just preceding the flowering of this great continent had been

one of great success in research in the Europe from which we came. We, originally coming to a new land and facing new problems and new barriers, did not have the time or, frankly, the mental approach to make the kind of experiments and discoveries that permitted the development of completely new thoughts. We did develop from time to time some outstanding men, but mostly we continued to rely upon the genius of Europe to generate the new ideas that were to be developed in this country.

We took those ideas, polished them and developed them into many-faceted achievements as no other nation in history had ever done. We became a nation of technological progress. We were the nation of "know-how." We were *not* the nation of "know-why." Even as late as 1930 you will find that we, as a nation, had developed only three Nobel Prize winners in the physical sciences. We still sent young men to sit at the feet of the great in Europe. We were not the original thinkers, we were the developers. We were the doers, the practical people, the pragmatic people.

Don't let anyone for a moment downgrade the fact that our qualities were "know-how" and not "know-why." "Know-how" in and of itself is a great quality. No idea is worth its salt unless there are people who can take it and develop everything that's in it. This has been a great American quality.

When the second World War came, we not only were pushed against our own will to world military leadership, we were at the same time pushed to scientific leadership of the free world. The great minds had to leave Europe during the war, and the great fountain of European knowledge dried up. Some of these men came here. Others, unfortunately went to the Soviet Union and formed the basis of the tremendous development of Communist science. For the first time we found ourselves faced with the proposition that we as a nation had to undertake basic research in order to make use of the technology that our democracy had permitted to grow and develop.

Such basic research as we had done had been done, fundamentally, by the universities. Today basic research is a tripartite responsibility of the universities, of government and of business. In the latter field, we of business are more and more accepting our responsibilities.

As you add up the pluses and minuses, you find many pluses that lead us to the conclusion that we can not only retain our basic "know-how" capability but add to it a real "know-why" capability.

Basic new ideas flourish in a free society, in a society where men can think as they wish and say what they wish. This is true of our country, because America is still a young nation and, as such, basically a simple nation. We have not built up rules and shibboleths that keep men within the narrow confines of how things must or should be done.

We have a chance to become a "know-why" nation as well as a "know-how" nation because we have the greatest basic educational plant in the world, not always used most effectively—not capable of being redirected to our requirements to the same degree that that of a dictator-directed educational system in Soviet Russia is capable of being redirected—but still the greatest basic educational plant in the world. If we use it wisely, if we use it sensibly, if we

remember that no great source of *science* can grow without, also, a great source of understanding of the importance of the *liberal arts*, if we still are able to push our young people in the direction of recognition of the importance of this particular area, there is no reason why we should not move ahead.

Likewise, our military research will always push us into areas of fundamental development. We can't grow in steady, unhurried, logical progressive stages, because the Soviet doesn't grow in steady unhurried logical progressive stages. We have to reach out to the very far tomorrows—beyond the limited todays and immediate tomorrows—because we must be sure that we are not only up with them but ahead of them. Here, we must always reach for the ultimate. We cannot have a technocracy that merely improves ideas; we must generate fundamentally *new* ideas. When this is known, understood and recognized, it will move us ahead.

Finally, we are a competitive people. We have always lived and believed that we were better than the next guy. When we find a godless society like Soviet Russia really challenging us—turning out highly competent engineers and highly competent scientists and combining them to achieve technological achievements such as Sputnik III—then we respond to that challenge.

We have certain weaknesses too. We are, again, a practical people, used to dealing with things and not ideas; and we are a pleasure-loving people. The pursuit of happiness was written into our basic documents, but we sometimes get happiness and pleasure a little confused and we stretch a little bit beyond enduring happiness just to achieve the satisfaction of momentary pleasures.

Secondly, we are not as consistent in certain areas as is the man who faces us across the Iron Curtain. He is thoroughly capable of pursuing a long-range policy that directs itself towards our destruction, and he is thoroughly capable of directing all of the resources of the individual to achieve the ultimate purposes of the state.

Finally, we have not yet matured enough to the way of the scientist to give him the recognition necessary to permit scientific development to flourish in this country the way it should. To us, the scientist is still a little bit of a strange sort of fellow. We sometimes connect him with horror movies, and we sometimes are a little bit upset when we find he is completely a nonconformist and must remain a nonconformist in order to generate the fundamental ideas that oppose what has existed in the past. Until we give him the recognition and the status that he needs, and so clearly deserves—far more than money or social or political prestige—we will not establish the scientific group that our society needs in order to get forward.

Notwithstanding these weaknesses, the next forty years are going to produce the greatest flow of ideas, basic ideas and products that has ever been known in this world. I can't speak for the universe, but I have an idea that in my lifetime I may be able to talk about what's happening in it.

I do know that out of the vast areas of opportunity that exist at this time for basic ideas in our country, new ideas will come as they have never come before. And with this tremendous capacity that we have as a nation for turning

ideas to practical use, you will find practical developments around this world that have never been known in the history of man. This places on us, politically and socially, as well as militarily, the greatest burden that has ever been placed on a nation because if we use it wisely, we have an opportunity to lay the base for a lasting peace. If we use our capacity unwisely, we will see our way of life swept from this particular globe and replaced by a way of life that no one really can possibly believe is sound or decent or permanent.

Now, these developments come at a period in history when they are really needed, because there is a great surge in the world's population. The discoveries in health-giving, life-preserving drugs and medicines has created a population growth around this world, the like of which we have never known. For the first time hundreds of nations are not only hungry and crying for liberty, but also hungry and crying for a standard of life and a way of life that has been denied them throughout history.

With this tremendous surge of population, this tremendous surge of nationalism, and at the same time with declining resources around the world, you have all of the ingredients that gave Hitler the basis for "Lebensraum", and the Emperor the opportunity for a Pearl Harbor. Unless America uses the scientific opportunities that are at hand, it is difficult to see how we can have in the remainder of this century that new and better world which is, to a degree, ours to determine.

I can see great things happening that can affect not only us, but all nations. Mankind's first need is food. It's hard for us to believe in this country that there are people around the world who are still starving. It's hard to believe that there are not only individuals but nations that thirst. One day man is going to find a cheap way to extract salt from sea water. One of the few cases where I overruled my staff, when I was Director of the Budget, was to sustain an appropriation to continue research into the area of extracting salt from the sea water, because if this can be done economically, its economic and social impact, not only in our country but, more importantly, in the arid countries around the world, is beyond comprehension.

I do not think that it is beyond the bounds of reason to believe that we will find a way to control the weather and, having done so, we will give men in all parts of the world a climate in which to grow sufficient food to fill their stomachs.

I believe that we will have in the remainder of this century new forms of fertilizer, and also radiation of food for preservation purposes, that will make possible methods of growth, storage and distribution of food that have never existed before.

In terms of our material shortages which will certainly face us towards the end of this century, the basic thinking of science will, if pressed, find synthetic substitutes. Over and beyond that, I have long been convinced that there are opportunities in the ocean and below the ocean that mankind has not exploited to date. Our own efforts at our Electric Boat Division in the development of submarines for the protection of our peaceful way of life have fas-

cinated me because of the potential opportunities that lie within the ocean and below the ocean beds, where two-thirds of this particular planet's land mass lies.

I have a feeling, too, that one of the great ingredients of human civilization's growth, relatively cheap additional power, will be available to us, be within our grasp, in this century. I feel that experiments in nuclear fission and ultimately in thermonuclear energy with its unlimited source of supply, and experiments in the field of direct transmission of heat to power, will inevitably bring us an opportunity to distribute to power-short portions of the world not money, but the scientific largesse which the people of the world understand and appreciate far more.

In this era when we are, for the first time, really beginning to undertake the exploration of natural principles of man and the universe—in this period in which, for the first time, we realize that it is possible to know planets other than ours—it is the problem of a democratic people to know and understand the importance of our scientific growth in the research area.

For you, who carry a heavy measure of responsibility in the financial field, that field that provides the area of support for carrying out the practical development that has moved America so far, your problem will be, in my judgment, considerably greater. The results of basic research are sometimes seven to eight years away and in the interests of protecting the secrecy of developmental processes, companies cannot reveal what they have done or cannot reveal what they hope to do until they are well on the way. It is going to be most difficult to assess the kind of management that is able to tie the scientist to the engineer, to regard them not as two sets of quite strange people that must be kept apart, but to link them in the ordinary workings of a corporation. More importantly it is going to be most difficult to assess the kind of management that has the intelligence and the wisdom, not only to discover great new secrets but to make them pay off in a world in which dollars and cents are the mark and measure of the success of an experiment.

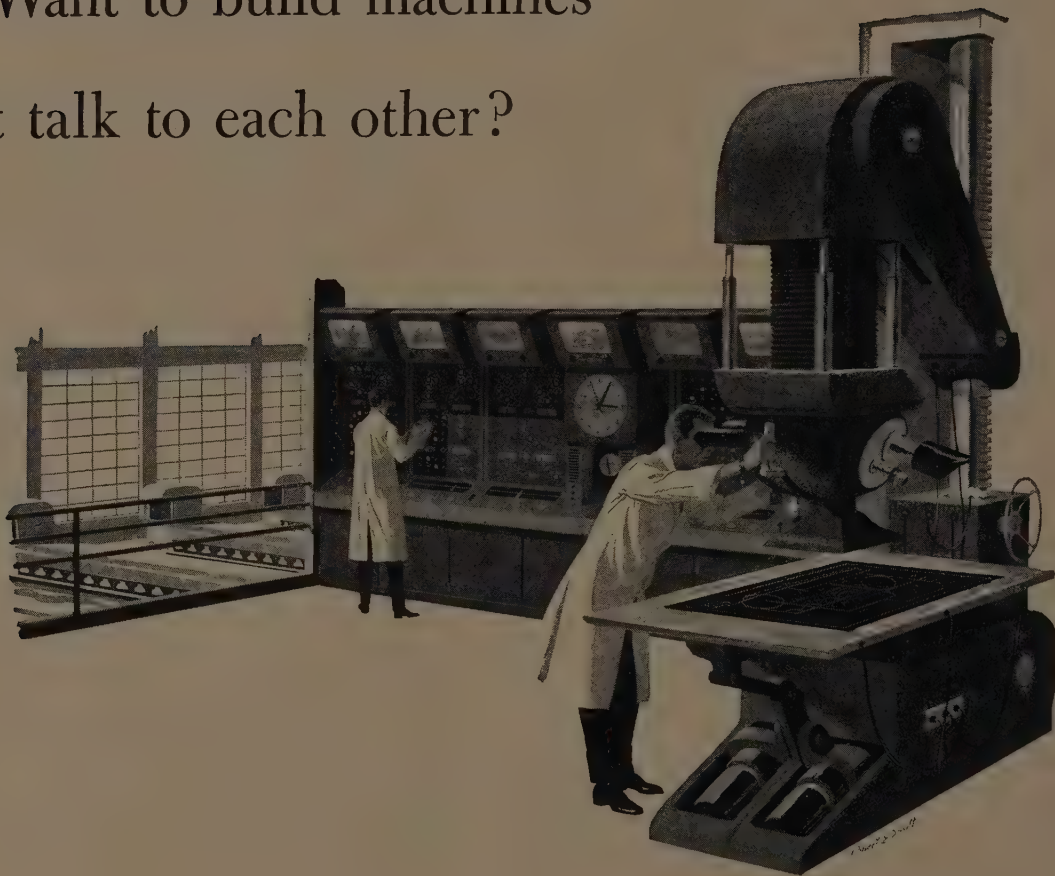
You live in the most exciting period that has ever been known to man. This is the turning point. These are the critical years. One of the factors of success or failure will be the wisdom with which we treat our responsibility to basic research and the real scientist.

No country, certainly no democracy, can ever make the grade if this is understood by the few. It must be understood by the many. And I say to you that as citizens of this country you will have responsibilities beyond that of the citizens of any country at any time in history. If you meet them well, the possibilities of one day establishing a lasting peace is in the hands of our free world. If you meet them badly, this civilization, this nation that we know and love so well could very well disappear from the face of the earth.

As a God fearing nation, we have every right to expect that we shall have a full opportunity to establish the former and not suffer the latter, but this cannot be if people are satisfied to say, "this is somebody else's problem." I can assure you it is *your* problem, it is your challenge. Your response to it will play its part in determining the course of history.

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ELECTRONICS INDUSTRY

A Summary of the Past, Present, and Future

CHARLES B. THORNTON

President, Litton Industries, Inc.

SOME TIME AGO when I was invited by Dick Link to talk to this national conference of Financial Analysts on the subject of the electronics industry, I readily accepted. I have been looking forward to this occasion.

Dick suggested that I confine myself to the business aspects of the electronics industry rather than the technical phases. Various panel discussions that were scheduled have adequately covered many of the details of electronics so my approach to the subject is to be more generic and less specific in detail than the others.

During the past three days you have listened to some very qualified speakers discuss electronic systems and instruments, missiles and space travel, electronic components, computers, and most of you have visited several electronic companies while here. I have cut and shortened my remarks since by now you are no doubt completely satiated with the subject of electronics, and would be on your way home if it were not for the 11:30 bus to Disneyland. During the process of shortening what I had intended to say to you today on the subject, "The Electronics Industry—A Summary of its Past, Present, and Future," the past was completely eliminated, as was much of the present and future. I feel little is to be gained if I recite to you facts and figures of which you and those of us in the electronics industry are all probably aware. You, as security analysts and professional advisers to the public investor, and we in the operating management of electronic companies, can benefit materially if, now and then, we can have the occasion to constructively criticize one another and exchange ideas.

There has been a wide gap of understanding in the thinking between us, speaking collectively and not individually. The gap must be bridged if we are both to perform our respective responsibilities satisfactorily. It is conferences of this kind that will be beneficial to both of us. This is the only reason I am here today, since my company does not plan to sell any additional securities to the public.

Some months ago I had lunch with a few of you in Boston, and we discussed the electronics industry. It was mentioned at that time that the sale of electronic products was running at an annual rate of almost \$7 billion, and that during the next decade that figure would more than double. In addition to the military market, it is believed that the influence of electronics is certain to be felt either directly or indirectly by almost every element of our national econ-

omy. Many products which are not considered related to electronics today will surely feel the impact of that science in the future. Some industries may see the whole character of their products change, while others, of course, will be much less affected.

I remember one fellow at that luncheon expressed his confidence in the future of electronics as a whole, but a complete lack of confidence in any one single electronics company. During the last few years, he and his clients had analyzed the financial statements of many electronics companies and had selected three in which to invest. These three were at the time, in his estimation, the three most promising. But not one of those companies lived up to expectations, even though each was selected on the basis of the highest book value per share, and the lowest price earnings ratio. A little later I will make some comments on this approach to evaluating companies.

Until the last year or so, our spiraling economy and the huge demand for electronic products, primarily by the military, has covered or obscured most of the inadequacies of many of us in industry, and of many of you, as astute financial analysts. Between the years 1940 to 1956 you and we, in our respective professions, looked good. Seldom was the question asked, "Did such and such a company enjoy its apparent success by luck or design?" "Was it carried along on the crest of a boom—a seller's market?" Too many of us began to judge the future by the past. Too often the glamour in our industry obscured the lack of broad capability in the management of a company. Developments such as electronic computers, atomic energy, automation, and, more recently, space caught the fancy of the public.

Thousands of new companies have been formed in the last ten years in our industry. And it has been estimated that during the past decade more scientific progress has been made than in all previously recorded history. During the next ten to twenty years, our rate of scientific achievement will be accelerated further. Why then are we alarmed daily by the number of scientifically-based companies that were considered "stars on the horizon" only a short time ago who are either non-existent or in difficulty today?

Before discussing this point further, let me say that as a member of the electronics industry I am proud of its record of accomplishment as a whole during the last decade or so. With all the weaknesses inherent in any great growth in-

dustry, it has met the requirements of our nation's defense which is of primary importance to all of us. It has been estimated that today the effectiveness of national defense would be reduced by 90 per cent if it were not for electronics. Missiles without electronic guidance would be sophisticated Fourth of July skyrockets; supersonic interceptor aircraft would be high-speed one-man transports, and, even then, would seldom be successful in navigating to a predetermined destination.

There are today more than 4,000 so-called electronics companies. This number includes the electronic divisions of many older established companies such as the electronic divisions of major electrical companies like General Electric, Westinghouse, the various aircraft companies, and others. Our industry is reaching for maturity but to do so there must evolve, as there evolved in other major industries as they matured, several strong, large, national companies. Only then will our industry begin to stabilize and become as efficient and as effective as is necessary to defend our nation better and to strengthen its national economy. This period of adjustment will be a healthy one, and I am confident that we have seen only a small degree to date of the strength and effectiveness of our electronics industry.

We have learned and are still learning in the electronics industry that many "tried and true" management philosophies and techniques need to be modified, others changed altogether, and even some new ones invented. However, there is certainly one principle which, if anything, is even more important than in the past. Basic to our American system is the profit incentive. Only those companies which continue to make acceptable and increasing profits can have the vigor and health to move aggressively ahead.

I would like to refer again to the use of price-earnings ratio as a measurement of the soundness of investment in electronics companies. It is not unlikely that a strong, well managed and profitable electronics company may reflect little or no profits on its profit and loss statement. Many financial analyses from blue-chip investment and brokerage firms recommend to their clients to sell or buy electronic stocks on some arbitrary mathematical basis such as a price-earnings ratio. I know one or two electronic stocks that are showing no earnings, and a few that are priced at thirty time earnings, which, as an investment—and I do not mean short-term speculation—are far better than a great many others whose market price is only six, eight, or ten-times earnings. A strong company today can increase its profits substantially if it stops implementing its plans for further growth in the future. Some people call this "taking off the cream."

In analyzing growth companies in a growth industry, *security* analysts must be *company* analysts. They must search out the answer to such questions as: What is the market potential for the company's new products? What is the nature and quality of the company's research effort? And where will it lead them?

Many of us in industry over the years have spent a great many hours trying to visualize the character of a successful company which may evolve out of our industry by the mid-sixties. As I indicated earlier, we believe there is a need for,

and there will be at least by the mid-sixties if not sooner, a few major national electronics-based companies.

Up to this point I have used some editorial license in speaking of the electronics industry. What I really mean is electronics-based industries, industries whose future product are strongly influenced by or dominated by electronics, and which are influenced directly in design by the advancing technology of electronics and related sciences. The opportunities for the application of electronic technology to the products of other industries should be kept in mind in the analysis, financial or otherwise, of an electronics company.

I have been asked on several occasions how one can analyze the strength and future potential of a so-called electronics company. I usually hesitate to express myself on this subject as any standards for an average company could be harmful instead of helpful when applied to any one of the great variety of companies that make up our industry. There are, however, one or two points that I consider important enough to mention here.

One, the balance of the management. Because of the great many complexities in a modern industrial company such as electronics, management must be an organization of specialists—specialists in scientific research-product development and design, manufacturing, marketing, finance, legal, industrial relations, and many others. No one specialty should dominate. It is the collective strength of the whole that makes a company strong and able to grow.

I have often heard executives in older established companies which were sales-dominated say that only sales were important; that if the product could not be sold, the company would not be in business. Scientists and engineers often say that if they did not develop the product, there would be no need for sales, manufacturing, or finance. The production people like to claim that if they could not produce the product, no one else would have a job in the company, and, of course, financial-dominated management takes the attitude that if they did not provide the money and handle it adequately, the company would not be there in the first place. Needless to say, all of them are right—partially. But to have a successful company all of the "rights" must be together in the form of executive specialists, with the environment established wherein they can realize constantly an effective interrelationship.

We in Litton believe that the most important part of our organization at any one given moment is the weakest part. It is always in that area where we are most likely to need added strength. Even more hazardous as an investment is a company whose success is dependent upon, or which is dominated by one or two or three individuals. The indispensable man is the greatest weakness that a company can possibly have. We have seen company after company grow to a certain point and then stagger and fall back. The strong individuals when the company was small that were its strength became the limitation of its continued success and growth beyond a certain point. The management people who feel they must retain all the decision-making to themselves limit the success of their company to the extent of their own individual intelligence and capacity.

In Litton I am sure that we have at least a half dozen or

more able executives that would be as good a president as that company has today. When I have made this statement on other occasions, people have asked me if it does not make me feel insecure in the position I hold. My answer has always been an emphatic "yes", but as long as our company continues to grow, we are so busy that neither they nor I have time to worry about it.

I should emphasize at this point that balanced management does not mean committee management. As Dr. Mace of our company says, "The camel must have been designed by the compromise decisions of a committee. No one man by himself could have designed such an atrocious looking animal."

Authorities and responsibilities must be vested in the chief executive officer of a company and, from him, "decentralized" to divisional general managers. However, a general manager must be selected on the basis of his ability to select and organize his group, get them to work together, and when his own knowledge is inadequate for decisions, he must have the ability to call upon additional knowledge and advice from others. The man who knows all the answers—the one-man band in modern industry—sooner or later can play only a funeral march.

The second standard is Planning. The fact that a company is in a growth industry does not mean, of course, that the company is going to be successful. Its management must have vision and long-term plans, and the capability to accomplish those plans. You and I have heard management state that their company was going to grow at five, ten, or twenty per cent per year, and when asked why, they simply said that the company had grown at that rate for the past five or ten years, and therefore they fully expected it to continue that rate of growth.

Adequate planning involves both near-term and long-range planning relative to research, development, engineering, sales, marketing, financing, and all other aspects of the total company. The whole subject of planning is like the weather—most companies talk about it but do little or nothing about it.

The third standard is Finance. The analysis of the financial statements of a growth company is only one of the many yardsticks necessary to consider. Basically the balance sheet should be sufficiently sound to permit the company to have access to loans well in excess of that which it anticipates requiring for its planned growth. A growth company should follow conservative accounting principles, even though its profits may temporarily be understated. Capitalizing research and development, reporting into sales and taking a profit on products partially completed are, in certain instances, acceptable, though not conservative accounting practices. The important measurement of a growth company is not what its profits are today, or for any twelve-months period, but what its earning and dividend paying capability will be when its growth rate begins to level off.

I do not believe a rapidly growing company should pay cash dividends unless it has beyond any doubt an excess of cash over and above its requirements for continued growth. Just recently I knew of a company that made a long-term loan at five and a half per cent in order to pay dividends.

In addition to the interest, it gave ten-year stock purchase warrants to the insurance company making the loan. If that company continues to grow at its present rate of ten per cent per year for ten years, and its stock doubles in value, the equity in the future of that company of the present stockholders has been diluted by the warrants, and, further, by the income tax paid on the cash dividends received. Those are the most expensive dividends that a company can pay.

Repeatedly I see investment advisory letters stating that the management of a company should be judged by whether or not the company is paying dividends. To repeat, I fully recognize that, to be a good investment, a company must pay cash dividends. I have only said that during a rapid growth period, it should not do so if the result is a dilution of the stockholder's equity.

A few days ago a very good friend of mine, and an important stockholder in more than one company, called me and told me of a company that he thought we might be interested in buying. I told him that it did not fit into our longer-range plans, and he said, "But look, you can buy this without any cash, just an exchange of stock!"

In the last year or so we have had a great many similar calls. Each time we have explained that we would rather pay cash for something that would fit into our plans than to exchange stock. If we pay cash we can set the assets up on our books for depreciation and tax purposes at the price we pay. And if any mistakes are made, losses can be written off against other profits of the company for tax purposes. However, if we give stock, especially in a tax-free stock exchange, the assets go on our books at their present book value. The premium payment for the going-concern value cannot be written off for tax purposes, and the stock given out stays out in perpetuity. It share in all future growth of the company regardless of whether such growth comes from that acquisition or not.

Obviously, of course, such a transaction cannot always be consummated on a cash basis. The case of our recent purchase of Monroe Calculating Machine Company is an example. In this instance, the stock base for Monroe went back to 1912. We clearly had to arrange an exchange of stock.

In general, a growth company can be judged by the adequacy of its plans for growth, its capabilities to implement those plans, and the soundness of its financial position. It must have depth and breadth of know-how, excellent facilities, and good research, engineering, production, manufacturing and sales organizations—and an apparent *future* dividend paying potential. An electronics growth company must not just be big—it must be strong. A corporate structure with unrelated bits and pieces hung under it does not mean growth.

Today on the horizon there appear to be, unfortunately, only three or four, or maybe five, electronics-based companies that have the concept, the ability, the vision, and the plans to become strong, profitable, five hundred million dollar sales companies by 1965. The electronics industry and the nation would be better off if there were at least three times that many holding such promise.



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OIL INDUSTRY

The International Outlook for Oil

ELMER PETERSON

Financial Vice President, Standard Oil Co. of California

ABOUT TWO YEARS AGO in Boston, the last time I had the pleasure of talking to your group, I chose the subject, "The Outlook for the International Oil Business," and if you were there you might recall that we came, or I came, to two general conclusions. First that the outlook, from a purely economic standpoint, appeared to be a pretty good one. Second that in the light of these economic prospects, the international oils were in a position to make a really valuable contribution in the broad area of national security and international relations. Since that time we have experienced two of the most eventful years in the history of the oil industry. Years which have certainly had an important influence on the future of foreign oil. So it seems appropriate now to bring the record up to date and try to see how the prospects for international oil shape up today.

A quick review of the major problems which have befallen the international oil business in the last two years at once brings to mind the foremost crisis, the closing of the Suez Canal with all of its world wide repercussions. More recently there has been the heated controversy over oil imports into the United States. And right now the international oils in common with all of industry are enduring the effects of our domestic recession. Under the circumstances it might be the better part of valor to temper the forecast of two years ago. But even though these unfavorable developments have taken place in the past months, I am still quietly confident about the outlook for international oil. The economic future of this business, as I see it, continues to be essentially a sound one. The international oils are today continuing to make an inestimable contribution to our national security and we have ample reason to be confident of their ability to go on doing so in the future. In the balance of this talk, I will try to support that conclusion.

A logical place to begin, I believe, is with a review of the present status of the international oil companies and of the factors most likely to effect that status in the future. It will come as a surprise to no one, I am sure, that oil companies in general have felt the impact of the current business recession in common with the rest of American industry. You are doubtless familiar with the first quarter results published by these firms which, without exception, indicate a decline in earnings from the levels of the first quarter a year ago. It is however, revealing to note that the interna-

tional oils have held up better under the impact of the recession than their purely domestic counterparts. In effect, foreign holdings have functioned as an anchor to windward protecting the international companies from the full effects of the domestic economic decline. Firms with only domestic interests by contrast have been hit rather severely. The reason for this, as you know, is that the recession, at least so far, has been largely confined to the United States. While there have been fears that the decline would spread extensively beyond our borders it remains today primarily an American affair. Thus consumption of petroleum in the free foreign countries, particularly in Europe, is continuing to grow at a promising pace, even though perhaps not as rapidly as we might wish.

Oil has a substantial energy breach to fill, particularly in the free foreign areas. I need not belabor the point that the free world is embarked upon an era of explosive growth and that the availability of energy is of paramount importance to this growth. The future of the international oil business rests upon a very fundamental trend, a sort of Malthusian principal in reverse. Population is growing along with a natural human desire to improve standards of living. For each step forward in living standards there is a corresponding, even a geometrical, advance in the consumption of petroleum. We have seen this happen in the past and we have every reason to expect it to continue. Parenthetically, I might also mention that the anticipated growth in energy requirements is expected to be more than sufficient to absorb potential output of nuclear energy. It is the view of most economists that there will be ample room for both oil and atom in the energy markets. In fact, both of these sources will be challenged to the utmost to meet the energy needs of the future.

Looking now at future prospects from the standpoint of supply, it is apparent that the international oils are in a favorable position for meeting the fast growing energy needs of the free world. Ten years ago the United States reserves were estimated proven reserves in billions of barrels at 24 7/10 billions of barrels. In 1957, 36 billions. The free foreign in the same period, the same decade, has grown from 50 billions to a present total of 205 billions of barrels. While the United States reserves are expected to continue growing at a moderate rate, the big developments of the future are obviously destined to be made on foreign soil.

Let us compare the relative production of the United States and free foreign areas. Again going back 10 years the United States production was over 5 million barrels a day as against approximately 2½ million foreign. In 1957 we are almost in balance in the approximate range of 8 million barrels a day each. Our projection for 10 years ahead is that the United States then will increase to 10 4/10 million barrels a day, which incidentally will be a tremendous job for the domestic industry considering the fact that the withdrawals in the meantime will be nearly equal to the present proven reserve, and the free foreign production is projected to be over 17 million barrels a day. The United States currently produces half the world's oil from less than 1/6 of the world's reserves. The ratio of production to reserves outside the United States is quite the opposite. The Middle East for example produces only a quarter of the world total from about 3/4 of the free world's known reserves. Obviously this sort of thing cannot go on indefinitely without seriously depleting American oil resources. Merely to supply our own needs, the United States production will have to look abroad for supplementation.

By 1967 we expect to be consuming more than 12½ million barrels of oil a day compared with 8 8/10 million barrels a day now. Present estimates set our production at around 10.4 in 1967 so it seems clear that the other 2 1/10 million barrels a day will have to be imported from the rest of the free world. Now that is the picture for the United States.

As to free foreign areas, their annual consumption requirements will gradually overtake those of the United States. By 1967 the consumption in free foreign areas should considerably exceed that of the United States although, as I have indicated, free foreign sources will supply not only their own needs but also a portion of the United States requirements and we have projected here that when their demand reaches 15 million barrels a day there will be a differential of over 2 million to be produced for shipment to this country.

My point in presenting the foregoing data to you has been to demonstrate how the free world is looking more and more to areas outside of the United States for its oil supplies. The implication of this for the future of the international oils is obvious. These companies, of course, are already well established in the free foreign areas as I previously indicated, realizing a growing proportion of their earnings from foreign sources. In the Middle East which is now, and increasingly so, becoming the fuel arsenal of Europe, United States owned companies share in something like 60% of all production.

The Chase Bank's compilation for 33 leading oil companies, American oil companies, in 1947 showed earnings from foreign sources amounting to 200 millions out of a total of a billion and a quarter. In 1957 the 33 companies, their earnings of one and two tenths billions out of three and one tenths billions or 40% of the earnings of the American industry as represented by the 33 companies, were from foreign sources. Now if we add to those 33 companies an estimate for the great number of smaller companies that are not included in that compilation you would still get approximately 25% of the income from foreign

earnings. To sum up this point then, the international companies are confronted by an unparalleled opportunity to be found in the swiftly growing energy requirements, of the free world. They have ample raw material resources to meet these energy needs and they are already experienced in the foreign oil business. I might also add that they have the confidence and are backing it by programming substantial foreign expenditures for the future in the order of about 6% more for every year; thus, on a purely economical analysis, the outlook for the international oils would appear to be quite promising and encouraging. I might stress at this point that my conclusions concerning the economic prospects for the international oils are by no means reached without due regard to some of the more pressing problems confronting these concerns and I should like to review these for you now.

An immediate problem to which they will have to face up the next five years is the growth of competition from new independent producers abroad. These are the companies which up until recently have confined their activities to the domestic scene. Recently, with the increased attractiveness of investment in the foreign oil concessions, they have gone abroad, found their oil and, are ready to contend for their share of the free world small markets. Now it is unlikely that anyone in an already high competitive business would be cheered by the advent of a new competitor in the market. In this regard the oil business is no different. There are bound to be some stresses as a result of this stiffened competition and it will take some time for the new foreign producers to find their place in an orderly pattern of world supply outside of the United States. Within the United States as well this is likely to bring about further complication of the imports picture; and the government may be called upon to enact some Solomon-like decisions. In the aggregate, however, I do not anticipate that this particular development will effect any drastic changes on the oil supply picture, and far from lamenting over the prospect of more competitors in the world market place, the international oils can at least take comfort in the fact that confidence in world investment is now strong enough to attract a continuing flow of new investment capital. Growth in competition among foreign producers reflects recognition of the need to expand future supplies outside of the United States in order to meet the growing energy needs of the world. It is a natural development in the evolution of the oil industry and I think provides us with very practical evidence that the future horizons of the international oil business are indeed quite full. The point is these companies can see on the long range the handwriting on the wall and that a foreign position is practically essential.

A somewhat more immediate problem at the moment, and one with which you are familiar with from a daily newspaper reading, is the matter of political unrest in certain of the major oil producing areas where American companies have invested heavily. There is, for example, the continuing ferment in the Middle East where various of the countries are struggling both within and among themselves to achieve their particular concept of political stability. There is, by way of another example, the present

civil disturbance in Indonesia. One might draw the snap conclusions from these developments that American oil investments abroad exist under a perpetual cloud of doubt. Indeed much of the publicity attendant to this political unrest has encouraged the conclusion that our days in foreign oil are numbered; however, the actual situation is materially different. In fact it might be said along the lines of Mark Twain's famous observation that, "the reports of my death have been highly exaggerated." I would not for a moment minimize the potential for economic loss to investors that is implicit in the political ferment swirling around some of our foreign oil operations. Currents of nationalism run high in these lands and there is always a highly vocal minority clamoring for a bigger share of the profits and sometimes even for expropriation of foreign holdings. At the same time, however, there are also level heads in the governments of these countries. Men who recognize that their national interests are served best by an equitable business alliance with a company that is a going concern. They fully recognize that a fair share of something is decidedly more advantageous than a lion's share of nothing.

The case of Iran, as you will recall, demonstrated this truism of international oil economics. In due time it became apparent that Iran's oil industry could not function successfully without foreign participation and so Iran restored its relations with foreign concerns. In the international oil business political problems are regarded as an occupational hazard. Concerns that operate abroad are also well aware of the fact that a foreign company makes a very acceptable scapegoat in any political dispute. So every effort is made to maintain the companies aloof to matters of purely domestic concern.

Recognizing the likelihood of sudden changes in the political climate as a part of the foreign environment, the international oils have likewise sought to protect themselves through the geographic diversification of their interests. Thus the sudden disruption of operations by one country can be compensated for elsewhere as was the case when various Middle East countries made up the production gap after Iran's industry became inoperable. To sum up on this point, it is quite true that political unrest is a source of concern almost wherever foreign oil operations exist. By a quirk of nature, some of the world's foremost oil deposits have been discovered in areas of relative political insecurity. But this is not to say that the companies involved are not as eager as the foreign companies that keep their oil ventures thriving. In most of these countries, oil royalties provide the principal source of income.

It would be an unpopular gesture indeed for any government, regardless of its political strife, to cut itself off from this income. No one is anxious to rock the boat, so to speak, and as a result the international oils are reasonably secured and well-insulated from the threat of nationalization. Now, one other point on this matter of the stability of foreign oil investments. Is the likelihood any stronger now that, because of unrest in the Middle East, some of the oil producing companies there will gravitate toward the Communists' sphere of influence? The answer to that, I would be inclined to say, is no. It is quite true, as Khrushchev has said, "Middle East oil is the West's most vulner-

able point." But exploiting that vulnerability is another matter. Despite what at times seems to be a disaffection for the West in some Middle East countries, these governments know that Russia has nothing to offer them. The U.S.S.R. could use little or none of the Middle East's oil and it is obvious that they have no intention of compensating these countries for loss of their present oil revenues. The Soviet grip over the area would certainly mark the end of independence there. The Arabs know this. They are a proud people. Proud of their hard won independence. They have no intention of accepting Russia's invitation to "come into my parlor." This it seems to me provides us with the foremost assurance that the Middle East will continue its joint ventures in oil with the western democracies.

Now to move on to another major problem confronting the international oils; the present controversy over imports into the United States. This is perhaps one of the longest standing issues dividing the American oil business, dating particularly from the first postwar importation of foreign crude oil and generally even before that. As a result of the current business decline, domestic producers have redoubled their efforts to slam the door on foreign imports once and for all. They apparently see in rigid imports controls a solution to their temporary problems which actually can be fully solved only by a revival of favorable business.

Both imports and domestic have grown but it would seem to be belaboring the facts to contend that imports are supplanting domestic oil. But natural gas has been primarily responsible for drying up some of the traditional markets for domestic oil. Erecting legislative obstacles to our trade with oil producing friends is almost certain to incur their enmity. This obviously, our country can ill afford to do.

In the years to come we expect to draw on this oil abroad to supplement our domestic supplies and prevent their premature depletion. Now, and for so long as the cold war persists, we are anxious to count these foreign oil producing investments in the camp of the western democracies. It seems plain that if we should now suddenly and unilaterally deny our markets to these countries we could hardly expect them to be very enthusiastic toward alliance with the West. One might reasonably ask why these foreign countries are not offended by the present voluntary control program but would be by legislative action such as a tariff. The answer to that is that foreign oil producing countries recognize the economic facts of life. They recognize that the United States is undergoing a business decline and that certain reasonable adjustments need to be made, but they would not recognize the validity of a legislative program designed primarily to freeze them out in the traditions of the pre-McKinley era. Doubtless even when these problems of the moment are solved others will arise to plague us.

Some of them are already foreseeable. For example, Europe's needs for a growing volume of oil from the Middle East is going to pose new transport problems, demand construction of a new pipe line, deepening of the Suez Canal and so forth. There will be unforeseeable problems too. Perhaps even crises. For certainly we can expect the Russian Bear to keep us from relaxing too securely in our chairs. Let me assure you I would not for a moment at-

tempt to minimize the insecurities inherent in the international oil business. That is its nature. But it is perhaps this very quality of insecurity that makes it attractive to investors. Most business and certainly the oil business entails a gamble. We recognize in the international oil business in particular a gamble exists at higher odds than we might ordinarily encounter in a domestic adventure. But higher odds offer attraction of higher returns, and prospects for future reward are high. We need look no further than our consumption forecast for assurance of that. Quite true, when you gamble at high odds, you know that the only thing that can surely be expected to happen is the unexpected. And so in the international oil business, it is a wise management that exists in a perpetual state of readiness for some sort of disruption, be it minor or major. You know from past experience that a crisis of some sort is likely to happen somewhere, sometime. You prepare for it by spreading your risks as much as possible and by being flexible enough to roll with the blow, wherever it may land. Still in all, you might ask, is experience and readiness

enough to cope with the problems of the moment, and of tomorrow? There obviously is no certain answer, but I can offer you a review of the past as a possible index to the future.

In the international oil industry we have met and substantially solved one major problem after another. We solved the staggering supply problems of World War II, met the demands of the post war boom, adjusted to the currency problem that subsequently developed, re-deployed the supply lines to fuel our forces in the Korean War, filled the supply breach when Iran's production was interrupted, and carried out the very successful oil lift to Europe, at the time the Suez crisis shut off the Middle East supply. And so it has gone. During all of these crises, the free world has never had to go without adequate supplies, thanks to the flexibility and resourcefulness of the international oil industry. I feel that we can make this claim in all modesty, that the record speaks for itself. And on the basis of this record, I again reiterate to you my confidence for the future of the international oil industry.

Crude Oil Reserves

EVERETT G. TROSTEL

Senior Vice President, DeGoyler & McNaughton

PETROLEUM RESERVES ARE ESTIMATES. They are somewhat different from say the reserves of gold. You can go down to Fort Knox, count the gold bricks and know just exactly how much gold reserve there is there. That is not true in petroleum. Petroleum reserves represent estimates. And in the case of any estimates, they are about as good as the estimator. An estimator of reserves should be a good technician, he should be completely unbiased, and he should certainly have sound judgment, judgment that is built on a wide range of experience. In the reserves which I am going to discuss this morning, I will be taking all published figures. In the case of the United States they represent the work of the A. P. I. Reserves Committee. In the case of foreign oil reserves they represent estimates of the various trade journals which I have put together: *World Oil*, *Oil and Gas Journal*, and I have also used our own publication *20th Century Statistics* which again is a compilation of published material.

Before getting into reserves themselves, and by the way I am going to talk just about crude oil reserves, you may find some figures slightly different from those which Mr. Peterson presented because his, I see, include natural gas liquids.

From now on, if I may, I would just like to talk with a series of slides.

Well I have the first slide before me. This represents the amount of energy, if you like, the accomplishment of the American petroleum industry in the last ten years. The top

slide shows the trend of the world's drill per year; here in the United States in 1948 about 40,000 wells. The number of well completions annually went up continuously; we hit a peak of 58,000 in 1956, slid off to 53,000 in 1957. In terms of millions of feet drilled, about 137 million feet in 1948, building to a peak of 234 million feet in 1956 and dropping off to 219 in 1957. That is a lot of feet. Just ran this through a while back and it is about 10 times around the world at the equator in the last ten years. We drill about once around the world a year.

Now it has cost money to do this. May I have the next slide? This chart I stole from one of John Morell's talks, the president of our firm. It is taken from statistics on the 36 larger companies in the United States, it is all domestic, and as you see it is the amount of expenditures for production and exploration, and it covers a longer period than what I am talking about generally. But, you can see the steadily increasing amount of money per year spent by these 36 companies. Back in the 1930 to 1942 period they are spending about 400 million a year, and the next period from 1943 to 1952 at the rate of about a billion three hundred million a year. This is exploration and production. They climb on up to two billion seven fifty in 1956 as pointed in this chart; 1957 is up right at three. Three billion dollars a year. This represents about half the production of these large companies and they are, I am sure, the most efficient companies. The total expenditures therefore, what it is costing us to maintain these reserves, find them

and produce them, is of the order of double this up to something like six billion dollars a year.

Now the amount of work that has been done; you don't see the wells like you used to, the derricks are not there. Like to show you what has happened in a few specific areas in the last ten years. The next slide please. It shows the oil and gas fields in the Gulf Coast, Louisiana, Texas, ten years ago, eleven years ago, in 1946. Next slide please.

This shows the picture in 1957, ten or eleven years later. Some 1,250 new fields. A lot of effort; this is one of the most prolific areas in the United States. Now the next slide please. This shows the number of fields that were found and have been developed in this ten year period. You can see the tremendous amount of work the industry has been in. Now go a few slides ahead please.

This is Canada, Western Canada. The situation in 1947, of course they got their big push with the finding of "The Duke", "Woodbin" in that year. Now the next slide, this is last year, 1957, you can see what has happened in Western Canada. A tremendous surge forward. This is foreign, if you like; many, many American companies, lot of American capital in Canada. The next slide shows what happened in the interim period. These little pieces with chunks carved out show the development and growth of a particular field, over this ten year period. Now with that as a background, I would like to show what has been happening to United States reserves. Next slide please.

What we generally talk about are remaining reserves, that is our estimate of future production. And on the basis of just crude oil, we are about 22 billion barrels in 1948. We built up our reserves to a peak of about a little over 30 billion, we slid off a bit last year, but we are right at 30 billion barrels for reserve now. Now this orange thing in here, is what we have produced. Now a real finding trend, if you like, represents this upper line of ultimate production. We have about 58 billion barrels found and produced in 1948, and we are very close to 90 billion barrels at the end of 1957. There is one thing you may notice—that is how far along are we in our over-all picture, and we are about the same, we are something under a third, we have a reserve that represents about a third of our total ultimate production, as estimated in 1948. And that is about where we stand in 1957. We have produced about two-thirds of what we think our total reserve to be now. But, of course, that evaluation will go on; it takes five years or so to really know how much oil there is in the newly discovered fields. You can project this upper curve—I do not know whose crystal ball you will want to use—we can run it up to 120 billion in another ten years or so, without too much trouble, with the continuation of trends. The top part of the chart is what is sometimes called "the year's life." The reserves at year's end, divided by the year's production. You could not get that oil out in that length of time, but it is a relative guide for 1948, at eleven and six-tenths equivalent years. At the end of 1957 we had eleven and seven-tenths; we picked up thirteen six, thirteen, thirteen; we have been sliding in the last four years. Next slide.

This is an analysis, represents reserve in terms of wells drilled; these are reserves found, what is found each year now. And we find in 1948, a good year, around 100,000

barrels per well drilled; these are total wells—exploration, dry holes, oil producers. Just one way of relating information, but I think a reasonable one. We had a good year in 1951. In 1952, 1953, on down to 1957 we have been sliding off. We have not been finding quite as much oil per well drilled. In terms of footage drilled, we find about the same thing. We found 28 barrels a foot in 1948. We were down to just 11 barrels a foot drilled in 1957. The average well in 1948 was about 3700 feet, in 1957 the average well around 4100 feet. The depth has been increasing continuously, that is one of the reasons it costs more money. The next slide please.

Now, I want to contrast reserves and production, so I need to run in what has happened to production. This is in terms of millions of barrels per day. In 1948 we were producing about 5½, slacked off a little in 1949, we have been picking up in our average production continuously, including 1957, to where we are producing a little better than 7 million barrels a day. This is of crude oil. Now an interesting thing that I wanted to put on this chart is the estimated productive capacity of the United States. The ability to produce without further drilling for a period of six months or so. Back in 1947 Texas was essentially wide open, it was producing under maximum good operating practice. California, for example, has been essentially wide open since the war, and has continued to produce fairly much of that condition. In 1952 the P.A.D., as a result of the Korean War, set up a formal estimate and we had just a little gap, but still it was a million barrels a day. This work is continued by the National Petroleum Council and the I.P.A.A. in recent years, to where at the present time, we are producing around seven million two a day, we have a capacity of nearly 9½ million barrels a day. Our reserves have not perhaps gone up in that proportion, but we have by drilling all these wells developed a tremendous capacity to produce and a large part of that capacity is in effect shut-in. I think that is a good thing to know. You know that this country has excess capacity and ability to produce.

It does have one unfortunate factor—and that is an operator spends a lot of money, he develops capacity to produce, then he is not allowed to produce that capacity. In fact, one major operator told me, a vice president, a few years ago, that his company had spent seven hundred million dollars since the end of World War I, and his productive capacity product had gone way up but he was only allowed to produce about the same number of barrels a day as he had before he had spent this tremendous amount of money. This operator incidentally is quite active, getting quite active, in the Middle East at the present time. The next slide please.

Now we can see how the reserves found compare to our production, which has been increasing. In 1948, which was a good year, we found almost twice as much oil as we produced. We produced right at 2 million, we found about 3 million 8. As time has gone on, we have had our good years in reserves. 1951 was a good year. Our production has crept up, our discoveries per year have dropped and for the first time in many, many years, in 1957 we produced more oil than it appears we found. The next slide please.

What are the trends? I have tied them all to this ten year period. On monthly well completion, in 1948 we were completing about 3300 wells a month. As time went on, this built up. We reached a peak of 4,860 wells per month in 1956. We averaged 4,446 in 1957. I do not know whether you can see this detail or not, there is an overlay of the monthly completions in 1957. It is somewhat seasonal, but you can see, I am sure, the decline in the number of well completions per month, starting in mid-1947 and continuing through March in 1958. Generally speaking, monthly well completions compared with a year ago, to get rid of some seasonal effect, March 1958 is off about 16% in the well completions from a year ago. The lower curve here, that of wildcat wells, as you see, the last five years or so have been fairly constant, approaching about 1,000 wildcat wells a month which we completed. Down a little in 1957, and here again you see this drop off, in the last six, nine months in the rate of completion. That percentage shows a drop off on the order of 20%. In millions of feet drilled per month, the climbing with time, a peak in 1956, a drop off in 1957, and a rather rapid drop off, not as fast however, as a trend in well completions. We look at active drilling rigs and they are pretty flat at 4600 to 4800 rigs. Actually the decline in rigs in 1956 was 4845 and 4791 in 1957. However, there has been a sharp drop off in the number of active drilling rigs in the last of 1957 and quite sharp in 1958. That as I recall is a little better than the 20%. You look at it and you find an interesting thing. You can't quite see it, but the crews working are more efficient. To compute, they are drilling more feet a hole, per rig, now, per month, than they did. The top curve is the number of active geophysical crews in the United States over the ten year period. I think this is quite interesting. You find that they peaked in 1952 with 772. They have been dropping continuously since that time. It reflects, I think, part of the conclusions of Mr. Peterson, as part of his remarks indicated that a lot of the operators are looking elsewhere for oil. Outside of the United States it is easier to find, if you could lick all the political, financial and marketing problems.

There is a lot of talk about the general situation of the industry. The recession certainly is causing trouble. There is another extremely important reason for petroleum, I am speaking primarily now of the producing industry, why it is down, and I hope the next slide will show it after a fashion. These two curves, overlying each other, to which I am pointing now, represent the supply and demand of all oils over this ten year time period. The solid line, if you can distinguish it, is demand. The dash line is supply. When you see a red smear, that means oil is going into storage. When you see green, it means oil is coming out of storage. Over the past ten year period—in 1948 we put a lot of oil in storage, things slipped off a little in 1949, but even so we took a little out. We took a little out in 1950 but we have been adding in 1951, 1952 and 1953. Just a little out in 1954. Just about flat even in 1955, but in 1956 and 1957 we were plowing a great deal of total oils into storage. As a matter of fact, if you look at the ten year picture, it's not a real good way to look at it, but go from about 500 million barrels of storage, all oils, in 1948 to

around 830 million at the end of 1957. It shows we have been adding continuously more or less over the period. However, in total day supply we were about 81 back here and we are about 89 now. That is not as bad as it looks as our utilization has been increasing tremendously over the past period. However, this spree of production is one of the things that has contributed to the trouble of the domestic producer during the last six months, nine months, or so. Let us look at imports and exports. This top curve here is our total imports. This bottom dark patch is our total exports. The orange in the middle are net imports. Our net imports have been increasing rather continuously over the past ten years. Might say, our total imports have stayed as all oils about even. First three months of this year, with past year, average. One thing that I haven't heard talked about a lot is that our exports are sharply down. As a matter of fact, as you can see here, we are at half of last year's average. We are down 75% from the early part of last year with the Suez crisis. All this is giving us an oversupply. Now what have we done about it.

As you can see, the first three months of this year, we are really taking oil out of stocks and getting in a more stable position. That has hurt operators in Texas. You know we are all down to 8 days, 8 days producing out of a month. But, a sharp correction is taking place. Just in the nominations for June, Texas will be down at 8 days in June. But of the nominating companies, there were four for 8 days and quite a few more for 9, and some for 10. It looks like the sharp restriction for production, curtailment of production, is bringing the producing industry in a better balance of supply and demand. I don't know exactly what it is, but we are getting better. We are approaching where we were last year and we ought to be in a better position than that, at least stable. But things are looking up, before the end of the year certainly we will see increasing number of days in Texas.

Now I will have to make thirty seconds of concluding remarks. Certainly, the shift in the world supply is toward, primarily, the Middle East. But, our industry certainly is sound. We have 30 billion barrels of reserves that we know of. That is a lot of oil. That is a lot of value. We have companies that are sound, who have this reserve, and this capacity; money to spend. They may not spend it all in the United States, but they are going to spend a lot of it here. We have a tragic condition, I think, of overproduction, coupled with recession, which is short range.

I would like to go to one slide, the last slide, this is one I stole from Mr. Morell also, but it shows what the petroleum industry has done for everyone in this country. This goes back; it is a thirty year picture. In 1927 oil was worth \$1.30 a barrel and gasoline cost \$.20½ a gallon. These are wholesale prices. The commodity price index was 62. In 1957 crude oil had gone up to \$3.07 a barrel average; that is an increase of 136%. It is up above the rate of increase for the commodity price index. But I think the amazing thing is that the industry kept the price of gasoline, wholesale, down to \$.223/10 per gallon an increase of only 9%. The overall effect of the petroleum industry has certainly been one to make available to the American public a large stable volume of gasoline at quite reasonable prices.

Petroleum, an Industry in Transition

FRED L. HARTLEY

Vice President, Union Oil Company of California

WE ARE ALL AWARE of the ferocious appetite for energy our civilization has acquired. My first slide here demonstrates this dynamic demand and provides the incentive for developing new hydro-carbon sources of supply. Now of course, there is one major difference in my talk and those you have already heard, in that I happen to have some information on another hydro-carbon source, namely shale.

1950 being a unit of one, you can see by the year 2010, our world energy requirements will be six times what they are today. Sort of hard to visualize society using that much energy and fortunately most of us will not have to stand in the way of it. It can be shown that the world's energy requirements, depicted here, will be directly related to the rate of population growth; at the rate of industrialization and technological advance, and the increase in energy required per unit of raw material processed, as the quality of the raw material deposits decrease. An example of that would be working over low-grade iron ore reserves versus high-grade. As we nibble into the lower quality of raw materials to feed our industry, the energy requirements for processing go up tremendously.

Narrowing down to United States energy requirements, this next slide shows our historic pattern as well as some predications for the future. Slide 2 shows the United States energy system, and this slide reveals some basic questions about just what energy inputs will be called upon to satisfy our requirements. The blank portion of the slide is unassigned. It is an area of decision which will be resolved in an economic climate, currently in its formative stages. There are opportunities here for corporate managements to increase their share of the energy market by technological advances. The petroleum component of the slide bears further study.

We in the United States use 9 million barrels of oil every day right now. Informed authorities estimate that by 1967 we will need about 14 million barrels a day. And by 1977, 22 million barrels a day which puts the curve clear out of the chart I am going to show next, slide no. 3. This next slide shows that the blue line represents the population of our country, in millions of people, and the energy demand, as far as crude oil is concerned, that the energy demand is growing out of proportion to the population, which of course helps to confirm that our technological needs are growing greater every day. The point of all this is that the amount of energy our society is consuming is increasing at a fantastically rapid rate, and the development of new sources of energy are essential, regardless of today's short term crude oil surplus. If there is a choice between domestic and foreign sources of energy, it is now obvious that military security, economic stability, more important, industrial growth in the United States will be maximized by continued emphasis on domestic supply. Last year in the

search for oil, wildcat wells were drilled at the rate of one every 45 minutes, every day of the year. This activity resulted in the discovery of new oil fields at the rate of two a day. Obviously only a minute portion of these are fields of major significance. In fact, at the present time, only one out of forty-four wildcat wells find a field that has as much as a million barrels of oil in it. The odds against finding a fifty million barrel field are 966 to 1. And over twenty million dollars a year is currently being spent on production research in the United States, in order to better understand the mechanism of oil occurrence and recovery. And hopefully to improve this situation. In 1859 the first commercial production of oil was achieved at a depth of less than 70 feet. The average depth of the wells drilled in the United States during 1957 was 4,122 feet—a new record.

This next slide shows record well depths from 1928 to 1956. Perhaps that graphically shows you the trend of the exploratory drilling in the oil industry in its search for oil. Someone said we are going down deeper and staying down longer and coming up with less.

These increased drilling depths result in increasing costs, have finally reached such levels as to require many of us in the basic business of supplying hydro-carbon energy to seriously consider alternate sources. These alternatives have long been recognized but always in the past have been looked upon as both technical and economic impossibilities. You have already heard, of course, this morning of one alternate source, foreign oil. Another which is coming to the fore at a very rapid rate, as has already been pointed out, is the increased adaptation of natural gas to replace liquid oil fuel.

Such an alternate source is shale oil, which was seen to be significant in our slide of the United States energy system. The oil content of a relatively small area of oil shale rock located in Northwestern Colorado, has recently been calculated by the United States Geologic Survey to be about one and one-half trillion barrels. This vast reserve of hydro-carbon energy is about six times as great as the known oil reserves of the world and is sufficient to supply United States needs at the current rate of consumption for about 450 years. Recognizing that the key to unlocking this river of oil was new technology, my company accepted nature's challenge and in 1955 established a research project to develop a commercial method of releasing the oil from the oil shale rock.

I am sure you will be interested in the discussion of our project since its outcome could lead to a major transition in the domestic petroleum industry's sources of hydro-carbon. To date we have spent nine million dollars on our research program.

This next slide is an air view of the shale demonstration plant located near Grand Valley in Northwestern Colorado. These are the shale mountains. Our oil supply comes from

up here and it is transported to the valley floor where we have our research station at this point here on the valley floor. These valleys here represent plenty of volume for the disposal of waste products which result from the processing of oil shale.

This slide is a picture of the cliffs and along about where that line is, there is where one of the major shale seams exists. It is about 90 feet thick and is reasonably continuous and has oil in it in such quantity that 3 square miles could be mined for 20 years and produce 50 thousand barrels of oil per day.

The next slide is a view of our demonstration plant facility. This is rock storage in the valley floor. We then bring it by conveyor to the retort proper and in this retort we are extracting oil at the present time at rates far in excess than we originally contemplated. This plant was set up to operate at about 350 tons a day rock throughput a day to produce somewhere around 150 barrels of oil. We have improved the technology to the point where we have reduced costs by about one third on the investment and tripled its capacity to the point now where the retort is running better than one thousand tons a day and is producing somewhere between five and seven hundred barrels of oil, depending upon the richness of the reserves we are working on. I think that is a significant number because it is somewhere between 50 and 70 times as great an oil supply from a single retort as is now coming from the average individual oil well in the United States at the present time.

The retort in which crushed rock is heated in order to release the shale oil is located on top of a small plateau above the valley floor and is shown right here. Rock is now being supplied to the retort from our new underground mine. I do not have a picture of our underground mine, but I do have one of the Bureau of Mines', which we will show next.

This is the kind of mining that will go on. Its technique is called room and pillar mining and permits recovery of about 75 per cent of the oil shale. The remainder of the oil shale forms the pillars that are left in place in order to support the roof. You can imagine yourself mining a room as wide as the one you are in now, as long as you would like to look towards Pasadena and about 4 or 5 times as high. That is the kind of a mining operation that is contemplated. It obviously permits the use of tremendous machinery and is in no way comparable to the mining of 6 to 10 foot seams of coal.

Oil shale rock looks like this next slide. It actually does not contain oil, but contains a material known as kerogen. This material is decomposed into shale oil during retorting.

The retorting step in which the oil and gas are extracted is carried out in this retort, and proceeds as follows. Next slide please.

This is a picture of the retort at the time of its completion. It is much neater looking at the present time. This retort represents a lot of facilities of mechanical installations not normal to the usual commercial retort because this section over here has all to do with the sampling of rock. It is extremely important in running a solids flow process to have ways of taking an average sample. I will give you a detail here. Every day we feed a thousand tons of rock

into that retort, we take a systematic analytical basis of about 25 tons of rock, and finally end up with a small 4-ounce bag of it in order to determine its oil content, so that we accurately know what has been fed into the retort. The next slide actually shows what occurs in the retort. We have as a feature of the retort this rock pump. And the rock is taken in here, fed in by a conveyor and is pushed up into the retort, and flows right up and over the top and out as ash. Now while the rock is going up, starting at the top we have air coming in from the atmosphere being pre-heated from the rising ash from the retorted rock, then entering into a high temperature combustion zone where we burn off the fixed carbon in the rock. By doing that we end up with hot combustion gases. Those gases contain sufficient energy to heat up the rock to the temperatures required for thermo decomposition. Then, as if by magic, the cold rock rising contains sufficient coldness, if I may use that expression, that it condenses out the oil and all the gases so that at this point here we take out a mixture of oil and combustible gas. There is no cooling water required; for those of you from Colorado, and perhaps even more for those of you from California, the fact that we do not need cooling water is very important.

Now in order to give you a little better idea of this rock pump, which is one of the keys to the process, may I have the next slide please. This is step one and the rock pump is over in the loading position. It takes on a load of rock in a cylinder, below that cylinder of course there is a bisk. This rock pump is oscillated into the vertical position, directly above the bottom opening of the retort. Then the piston is moved, the rock is forced into the retort. Then the piston and cylinder return to the loading position again and the cycle is repeated. It is a slow speed operation, but it is a device that will last many, many years.

Well, just a quick look at shale oil. That is crude oil, as you can see, it is liquid. For crude oil is liquid. Shale oil is loaded with gases.

So the next problem is what to do with this stuff after you obtain it. Well, fortunately, we have developed refining techniques today, to the point now, where we would much rather start with the 20-gravity shale oil, than we would with many of the crudes that are both produced in this country and from Venezuela and some of the lower quality Middle East crudes. We have completed our refining work and from the shale oil we now have made gasoline, diesel, jet fuel, all of which are indistinguishable chemically from their natural petroleum counterparts.

You would be interested in knowing that we have shipped barrel quantities samples of JP4, jet fuel, and ring diesel fuel, to the United States Navy for their independent evaluation and upon a discussion in Washington, two weeks ago, we have been assured that the samples we have submitted have set up new standards of quality for use by the Air Force and Navy.

This next slide is an interesting one because it demonstrates a basic point concerning the economics of the shale oil picture. And that is, in contrast to the ever-rising cost of finding, developing and producing crude oil, shale oil cost decreases with each new technological break-through. I might add that I left one cost out and that is the cost of

making, negotiating agreements with various organizations. But you can see, in general here, that crude oil costs are rising. Now shale oil costs are dropping because of technological break-throughs. And we have shown these drops here as perpendicular because as a result of technological advance we suddenly change the technique. It would be as if we were able to suddenly learn how to drill a 20,000 foot hole for a quarter of the price of the present cost of drilling same. Certainly that would change the cost of finding the oil and producing crude oil. Nevertheless, it looks like we are going in that direction all the time.

Competition is therefore really between two fields of technical knowledge and skill. When exactly these two curves will converge cannot be answered specifically because it will depend upon individual corporate situations. A convergence of the two curves does not necessarily mean that shale oil is better, is a better corporate bet than continued wildcatting. It would mean, though, that a long range study is in order for those corporations with oil shale reserves. Shale oil could increase an economic trend and this is a result of increased values received from other products of the operation. A sudden realization of our country's need for additional, dependable sources of liquid hydrocarbons, within its own borders, could spark this potential new industry into its existence. A possible candidate for the previously noted unmarked area, in the United States energy slide system, is energy from liquid hydrocarbons derived from bituminous sands, frequently referred to as tar-sands. While the use of such native hydrocarbons might be considered economically marginal at this time, much work is being done both here and in Canada to develop techniques which will upgrade the use of these deposits. This next slide shows the deposit of such sands containing twenty million barrels of oil, located near Santa Barbara County. At the present time, we are erecting on that site a two-hundred-ton per day demonstration unit to remove the oil from the sands.

Against this back-drop of energy demand and the long range transition of petroleum raw material supply, the industry is faced with the changing character of products required by our customers. Anticipated demand for various classes of petroleum products is described in this next slide: Pacific Coast Product Demand. It can be seen that the demand for gasoline and jet fuel is expected to increase over the next few years, while the demand for fuel oil and other heavier products is expected to remain stable, or to decline slightly. For the great interest and much conversation about the forthcoming jet age, it will probably be no surprise for you to note that in this next slide we are already indeed in the jet age, to the extent that sales of jet fuel now exceed aviation gasoline, known as av-gas in the industry of sales. The delivery of commercial jet aircraft to our domestic airlines is of course expected to widen the gap still further. One point to make on jet fuel is that it can be reasonably simple compared to aviation gasolines. One requirement that is most important is that it does not require octane quality. The result of this is that it is not necessary to use tetra-ethyl lead in its manufacturing.

We have examined several good indices of change: Brake horsepower, engine displacement, compression ratio.

All of them are in the upper direction. As engines have changed, fuels and lubricants have necessarily changed with them. And the petroleum industry has accepted the responsibility for making the investments needed to provide the new processes by which, for example, the higher octane fuels have been manufactured and supplied at reasonable prices. This has developed into a brisk octane race, topped only by the even livelier horsepower race from whence it originated. These accelerating maneuvers may soon fall under the jurisdiction of the immutable law of diminishing returns, primarily from the standpoint of the cost of manufacturing these new higher octane fuels, and the lack of sufficient increased performance in our customers' automobiles. We used to start with fuel oil and up-grade it by processing to produce gasoline. Now for the higher octane, we must start with finished gasoline and up-grade it still further. The impact of this requirement upon profitability of operations is obvious. Perhaps that is the key to the fact that international companies did better than domestic companies in the last quarter. The enormous reserves of horsepower designed into current automobiles have been reflected in changes in engine operation. We have been examining the manner in which the average motorist actually operated his vehicle under today's traffic conditions. It is apparent, for example, that a hundred or even two hundred octane would do no good for the motorist while the automobile engine is idling at a traffic light, or in a freeway traffic jam, a major pastime for most of us who drive in the Los Angeles gasoline marketing area. Other important time periods while driving are devoted to part throttle, or part power operation. In fact, only a small fraction of engine operation involves full throttle.

These next two slides show how two representative motorists actually drove their cars when they were totally unaware that their actions were being recorded. To the right of the slide, you will see the percent of full power. It is only about 1% of the driving time. Most of the time the car is either idling or just cruising along with the power requirement somewhere between zero and forty per cent. Next slide shows this same driving habit of our customer when he is on the highway and heading for Las Vegas. Again, you see, excited as he may be, nevertheless he does not require full power.

It has been estimated that the difference between 98½ octane and 102 octane could cost the motorist fifty to sixty cents per tankful. This next slide shows the approximate cost of premium gasoline, octane improvement up to one hundred octane, and a composite prediction of the cost above one hundred octane, employing today's octane making processes. As you can see, we are really going up in a hurry. Unless the motorist can get value out of that gasoline that he puts into his car, as we are forced to raise the price to make gasoline of that quality, this is a losing proposition. Here is an area of technical challenge for the industry. If knowledge of nature's secrets can be raised sufficiently to permit the manufacture of these higher octane fuels, at or near present cost levels, and this is a poor research bet, in my opinion, then tomorrow's motorist with higher compression ratio cars, will enjoy the economy of such fuels. However, as of today, gasoline prices must in-

crease with each additional octane increase. And this price increase more than cancels out the improved engine economy afforded by the super octane fuels.

To produce today's gasoline octanes, the industry has made another important transition. Not too many years ago, gasoline was essentially a blend of natural occurring hydro-carbons; today it is a blend of specific chemicals. Gasoline has now become a chemical fuel in every sense of the word. The requirements for purity certainly match recognized pharmaceutical standards. To raise the octane rating of gasoline by catalytic reforming, it is necessary to use feed stock containing less than one part per million of nitrogen, and less than a hundred parts per billion of arsenic. Today's highest octane chemical fuel contains synthesized isoparaffins made by the alkylation of butaline and isabutane and aromatics such as benzene, toylene, and zio-lene. produced by the catalytic dehydrogenation of naph-thenes. No doubt the industry will be going further in the direction of catalytic processing by installing facilities such as the next three slides illustrate. Will you show the next three slides?

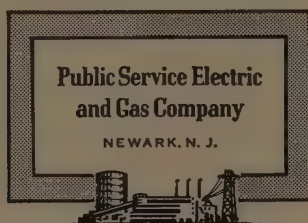
Although catalysis itself is still regarded as something of an art, extensive studies are under way in many laboratories, both in industry and in universities, to develop a better understanding of the mechanism, to permit prediction of catalysis composition useful for specific conversion of hydro-carbons. These slides show catalysis preparation in the successive product stages. The next two slides please.

Over the past forty years the quality of mid-barrel prod-

ucts, such as diesel fuel for engines, and heating oil for homes, has been almost entirely dependent upon the quality of crude oil. Those are catalysis slides in various stages of preparation. Now, with the advent of catalytic desulfuriza-tion, which we call "Union-fining" to describe Union's propriety process, we can make the highest quality diesel from the lowest quality crude oil. By the addition of hydro-gen to the raw distillates under pressure and in the presence of new and unique catalysis, it is possible to remove im-purities to a spectacular extent. Sulfur, for example, is re-moved as hydrogen-sulfide, which in turn is converted to elemental sulfur and sold on the chemical market. The process is low in cost and, as a result, is receiving wide application. We can see developing a quickening pace to transition from natural occurring mid-barrel fuels to new and improved products of greater hydro-carbon purity.

I have a little more to say here in the chemicals area but my talking time is up. Suffice to say, the oil industry is progressing into the chemical field at a very rapid rate. The next two slides will indicate trends of growth, and you can see they are tremendous. And the same thing applies in Canada. May I have the last slide please.

In our reasonably free competitive economy, I said reason-ably free there, change is the rule rather than the excep-tion. The requirement for awareness and new technology, resulting in actual and potential transitions in the petro-leum industry today, as we have discussed, is incumbent upon oil management and those of you here today who undertake the responsibility of correctly advising investors.



QUARTERLY DIVIDENDS

The Board of Directors has de-clared the following dividends for the quarter ending June 30, 1958:

Class of Stock	Dividend Per Share
4.08% Cumulative Preferred	.. \$1.02
4.18% Cumulative Preferred	.. 1.045
4.30% Cumulative Preferred	.. 1.075
5.05% Cumulative Preferred	.. 1.2625
\$1.40 Dividend Preference	.. .35
Common	45

All dividends are payable on or before June 30, 1958 to stock-holders of record May 29, 1958.

F. MILTON LUDLOW
Secretary





AMERICA'S FIRST TOBACCO MERCHANTS • ESTABLISHED 1760

DIVIDEND NOTICE





Dividend of \$1.75 per share on the Pre-ferred Stock and an interim dividend of 70c per share on the outstanding Common Stock of P. Lorillard Company have been declared payable July 1, 1958, to stockholders of record at the close of business June 3, 1958. Checks will be mailed.

G. O. DAVIES, Treasurer

New York, May 21, 1958

Cigarettes
OLD GOLD
STRAIGHTS
Regular
Crush-Proof Box

OLD GOLD
Filter Kings

KENT
Regular
King Size
Crush-Proof Box

NEWPORT
Crush-Proof Box

EMERALD
King Size

MURAD
HELMAR

Smoking Tobaccos
BRIGGS
UNION LEADER
FRIENDS
INDIA HOUSE

Chewing Tobaccos
BEECH-NUT
BAGPIPE
HAVANA BLOSSOM

Little Cigars
BETWEEN
THE ACTS

Magnavox

data handling
equipment for
missile maintenance...
Magnacard

LARGE CAPACITY FILES

RAPID RANDOM ACCESS

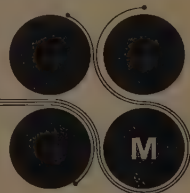
EFFICIENT ROUTINE PROCESSING

A system with complete files, complete data and complete processing . . . to handle all operations.

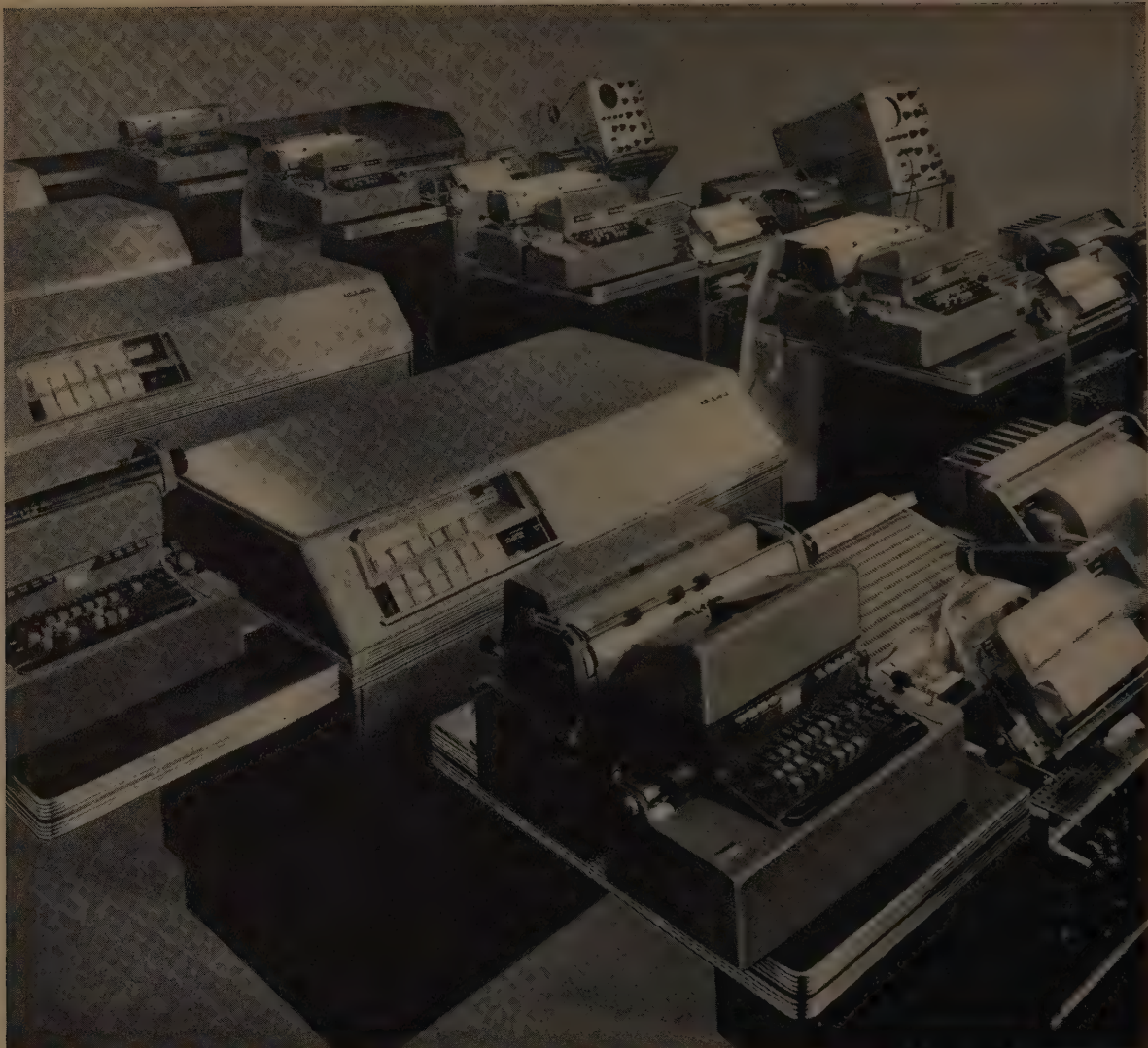
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FIELD TRIPS

TRIP A—Jon B. Lovelace, Jr.
Capital Research Company

Western Air Lines, Inc.

Western Air Lines gave our group a splendid send-off with a cocktail reception held in the patio of the company's general headquarters building at the Los Angeles International Airport. A number of company officials were present, headed by Terrell C. Drinkwater, President, and J. Judson Taylor, Vice President and Treasurer.

Since many in the group had heard Mr. Drinkwater speak at the Air Transportation forum earlier, he gave only a short talk which was followed by a question period. A good part of the discussion related to the Air Line Pilots strike against the company, which has since been settled. In a poll of the analysts taken after a question about penalty charges for airline "no-shows", the great majority of those present indicated that they thought higher charges would be appropriate, rather than an elimination of the penalty.

We were conducted on an interesting tour of Western's general headquarters, including the accounting offices, the maintenance facilities, and the training school, where the flight simulator for pilot training was of particular interest. We then boarded one of Western's DC-6Bs for our flight to Las Vegas. Because of the strike the crew consisted entirely of supervisory personnel, and so we were treated to a flight which had two Chief Pilots at the controls, with a Regional Supervisor of Stewardesses and the Supervisor of Stewardess Training serving our group in the cabin. En route we had the opportunity to sample Western's famed "Champagne Flight" hospitality, complete with a delicious steak dinner, and a surprise birthday cake for one of the analysts. At Las Vegas we stayed at the lovely Hotel Sahara.

Stauffer Chemical Company

On Tuesday, May 21, we were off to an early start with 95% of our group present for a breakfast meeting at the new Hotel Tropicana as guests of Stauffer. Company officials at the meeting were J. W. Kettle, Treasurer; R. W. Gunder, Vice President, Pacific Coast; C. L. Arnold, Vice President of Research; and A. T. Newell, Works Manager at the Henderson plant.

Mr. Gunder pointed out that Stauffer has 50 plants across the country and that the Henderson plant is one of two producing chlorine and caustic soda. During World War II this Henderson plant was part of the Government's magnesium operation. At the end of the war it was sold to the State of Nevada for \$20 million, and then it was purchased by Stauffer for less than \$5 million.

The basic raw materials at Stauffer's chlorine and caustic plant are rock salt, water and electricity. The salt is shipped

in from Amboy, California, and water and electricity come from nearby Lake Mead and Hoover Dam. The process consists essentially of dissolving salt in water to form brine; passing an electric current through the brine to form caustic soda, chlorine gas and hydrogen gas; evaporation of the caustic soda to a concentrated form; drying, cooling and compressing chlorine gas to obtain liquid chlorine; and washing and compressing hydrogen gas for use.

The chlorine gas is pumped through a pipeline to other companies at Henderson for uses such as the production of titanium. Liquid chlorine is shipped and used for the purification of water, bleaching of textiles and paper, and the manufacture of insecticides such as DDT and BHC by this company, and for many other chemical products for both civilian and defense purposes. The caustic soda is shipped and used in the manufacture of soap, synthetic detergents, oil refining, rayon, rubber, paper, dyes, metal processing, and many chemicals.

At Henderson a substantial amount of the chlorine produced is used in various chlorinated agricultural chemicals. Stauffer, together with Montrose Chemical, has formed the Montrose Chemical Corp. of California, which is one of the larger producers of DDT. Stauffer Research has developed several special formulas in recent years which represent an upgrading of the basic agricultural chemical formulations and are more profitable. These include Captan, a fungicide; Vapam, a soil sterilant; and Trithion, a phosphate insecticide. The latter, produced at Henderson, was introduced this Spring and sales have been very encouraging.

Dr. Arnold reported that Stauffer's research expenditures would be at the same level as last year, around \$3.4 million, and could be divided as about 40% for improvements of existing products, 40% in a new area where it may take one to three years before research is translated to production, and 20% for longer-range projects. In the latter two categories is the work Stauffer is doing on developing the processing procedures of the special metals—titanium, zirconium, columbium and tantalum. Research is also being done on boron hydrides and fluorine used in high energy fuels and oxidizers and on organic polymers of boron, phosphorus and fluorine which have high temperature resistant properties. Stauffer has formed a joint venture with Aerojet General which has been awarded a contract to do pilot scale work on a process for making boron containing fuels.

After the enjoyable and informative breakfast forum, we were taken by bus to Henderson and were escorted in small groups through the various buildings. We were shown where the rock salt comes in by rail and truck and where it is dissolved in water, treated, filtered and pumped to the electrolytic cells. The cell building contains many rows of cells; direct current is used and each cell contains a graphite anode and an iron cathode separated by a porous diaphragm

of asbestos. Weak caustic soda liquor is discharged from the front of each cell, chlorine gas is piped from the top and hydrogen gas leaves the cell through a connector in the back.

We then went to the liquefaction plant where the chlorine gas is cooled, dried with sulphuric acid, and compressed to a liquid for shipment. Next was the plant where the weak caustic soda from the cells is boiled down to obtain caustic soda liquor containing 50% sodium hydroxide and then piped to the solid caustic plant where it is solidified before shipment. We visited the building where the new insecticide, Trithion is made. This product controls some 104 varieties of pests on 45 crops. We also stopped by the plant of their affiliate, Montrose of California, where intermediates are produced and then shipped to Montrose's Torrance plant for conversion to finished DDT.

Titanium Metals Corporation

Mr. P. J. Maddex, Plant Manager of the Henderson facility, met with the analysts in the company's conference room and, together with members of his staff, discussed TMCA's operations at Henderson. His comments were supplemented by photographic slides which enabled us to get a most graphic idea of virtually all steps leading from the processing of raw ore to the shipping of huge ingots. Ingots are shipped from this plant to TMCA's new mill in Toronto,

Ohio for rolling and forging. These two facilities make TMCA the country's most fully-integrated titanium production operation. A supply of product samples was available, and each analyst was given a small container of both rutile ore and titanium sponge.

Mr. Maddex further explained how certain of TMCA's processes differed from those of other producers because of the particular type of ore which the company imports from Australia. He also pointed out, through the use of comparative photographic slides, many of the substantial advances which the company has been able to make in increasing productive capacity. An interesting side note was the fact that one of TMCA's large towers constituted the tallest structure in Nevada for a brief period of time, until construction was completed on one of the new Las Vegas hotels.

Following the description of the Henderson facility Mr. Maddex answered questions concerning the plant and the production process, such as sodium versus magnesium in the reduction process, size of batches, and technology pertaining to the development of making larger ingots. A member of the research staff covered inquiries concerning the physical properties of titanium, such as heat resistance, tensile strength and non-corrosiveness, and their application to the aircraft, missile, chemical equipment and electronic industries.

After the question period, Mr. Maddex and his associates conducted a brief bus tour of the plant, pointing out the function of the various installations and the general product process flow.

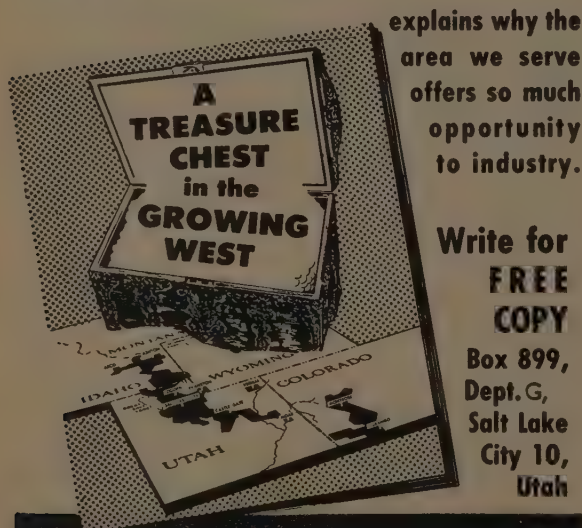
American Potash & Chemical Corp.

Our first stop was at the "Unit No. 4" Henderson facilities where American Potash & Chemical produces sodium chlorate, potassium chlorate, and sodium perchlorate. The raw materials used are common salt from Amboy, California, water from Lake Mead, and electrical energy from Hoover and Davis Dams. The salt is first dissolved in water and then this solution is circulated through a series of electrolytic cells. Hydrogen and oxygen are released; the oxygen combines with the salt, forming sodium chlorate; the hydrogen formed is drawn off and exhausted to the atmosphere. The solution is cooled, and the sodium chlorate crystallizes out and is separated from the solution by a centrifugal force. All moisture is removed in a rotary drier and the product is packaged for shipment and use in the manufacture of weed killers, defoliants and bleaches. Sodium chlorate is also processed further in the plant as a raw material for the manufacture of potassium chlorate and the perchlorates.

Sodium chlorate is also dissolved and mixed with potash (potassium chloride) to yield potassium chlorate and salt. The potassium chlorate is produced in a process very similar to that used for sodium chlorate. This material is used in the manufacture of matches, fireworks, and some military items.

The group of chemicals known as perchlorates contain one more oxygen atom than do the chlorates, and in the company's process this oxygen is added by means of a

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second electrolysis step. Sodium chlorate is dissolved and fed to a battery of electrolytic cells containing platinum anodes. Again, the water is decomposed to hydrogen and oxygen and another atom of oxygen attaches itself to the sodium chlorate, making it sodium perchlorate. This chemical is not an end product, but when combined with the salt of potassium or ammonia, it is converted into potassium perchlorate or ammonium perchlorate. Large tonnages of these products are used in the manufacture of rocket fuel.

We then proceeded by bus to the Navy-owned plant in which ammonium perchlorate is produced. The most important raw material in its manufacture is sodium perchlorate which is piped from Unit No. 4 as a solution. It is combined in a reactor with anhydrous ammonia and hydrochloric acid to produce ammonium perchlorate and salt. The two are separated by selective crystallization and the ammonium perchlorate is dried, screened, blended and packed. The sole outlet for ammonium perchlorate is in solid propellant rocket fuel. It is considered to be the preferred oxidizer in high performance solid propellants for rocket engines and JATO units, and has played a major role in the propellants used in such missiles as Vanguard, Far-Side, Explorer and many others.

The group passed by the unit where the electrolytic portion of the company's manganese dioxide operation is conducted, on the way to the research building. The manganese dioxide operation is a separate process. Low-grade manganese-bearing ores are used to produce synthetically, by electrolytic means, a product of high purity, having the peculiar qualities which make some types of manganese dioxide suitable for use in dry cells. The process was developed by the company under the auspices of the United States Army Signal Corps to permit manufacture of a superior, heavy duty, military dry cell. While this has been the predominant use to date, due to the unusually long life of batteries made from this material, its potential application for use in hearing aid batteries, radio batteries, etc. is considered to be tremendous.

The last stop was at the research department. We were shown the physical testing section and the bench-scale and pilot-plant work being conducted on a variety of projects, including electrolytic manganese metal and a chemical method of producing manganese dioxide. We also viewed the pilot plant in which decaborane is being produced.

After the Henderson tour, Western Air Lines flew our group to Inyokern, via a route which provided a view of Lake Mead and Hoover Dam.

From Inyokern to Trona by bus we passed the Naval Ordnance Test Station at China Lake, California, and descriptive material on these facilities was provided. At Trona most of the group were billeted at the company's "El Rancho Arahas" (all good analysts figured that one out). We immediately donned helmets and safety glasses and proceeded on a tour of the Trona facilities.

The Trona plant is located on the shore of Searles Lake, a so-called "dry" lake composed of minerals in crystalline form permeated by a dense alkaline brine. Searles Lake is the third of a chain of five prehistoric lakes that started with Owens Lake in Owens Valley and ended in Death

Valley. When it was full of water, Searles Lake covered an area of about 400 square miles and was over 600 feet deep. The salt body covers twelve square miles to a depth of eighty feet. Actually, there are two layers of salt separated by a layer of mud twenty feet thick. The second salt bed is twenty-five feet thick. Brine is pumped from both salt bodies to provide the raw material to the plant.

After the plant tour, we went by bus out onto Searles Lake, where H. S. Eastman of the company described the lake's history and structure, and American Potash's operation there.

In the evening we were treated to a cocktail party and a delicious Chinese dinner, and had an opportunity to meet and talk informally with not only the top corporate officials but also many of the company's supervisory personnel at Trona. The two members of our analysts group who hailed from Norway, Kaare Varvin and Stein Bergh-Jacobsen, expressed spontaneously at the dinner how impressed they were with the friendly spirit of the various company officials and analysts they had met on the trip, and with the vigor of the free enterprise system as they have seen it in action.

The evening meeting was conducted by R. B. Coons, Vice President, Administration, for the company. C. L. Dickenson, Director of Manufacturing at Trona, accompanied his review of the physical operations at the plant with color slides. Dr. D. E. Garrett, Manager of Research at Trona, provided both a further discussion of the geological history of Searles Lake, and also a description of current research activities at Trona. The meeting concluded at close to midnight, representing a 16-hour day for the analyst group.

United States Borax & Chemical Corp.

On the trip from Trona to Boron, company representatives were along on each bus to provide background information and to answer questions. At Boron we were met by President J. M. Gerstley, and went first to the top of the storage silo, for a panoramic view of the United States Borax facilities and the surrounding area. We then proceeded to the open-pit mine, viewed the 20 Mule Team which had been assembled for the occasion, and went by bus to the bottom of the huge pit. Company officials described the orebody formation, the previous underground operations and the current open-pit operations, and we toured part of the old mine tunnel.

The company then had a very pleasant reception before lunch, with most of the top operating management of United States Borax & Chemical on hand to meet with our group. After lunch we heard talks by James M. Gerstley, President; J. Frederick Corkill, Vice President and General Manager, Pacific Coast Borax Company Division; Dean R. Gidney, Vice President and General Manager, United States Potash Company Division; David V. Parker, Vice President, 20 Mule Team Products Division; Dr. Donald S. Taylor, Vice President and General Manager, United States Borax Research Corporation.

Following the speeches we viewed a very interesting 35-minute movie which the company had recently produced

entitled "The Borax Story". We then boarded the buses for the three-hour return journey to Los Angeles.

During the course of the 48-hour field trip we traveled more than 600 miles, met with the managements of five different companies, and spent evenings in such locations as Las Vegas, Nevada and Trona, California. For a trip with such a tight time schedule as this to be even possible, a high degree of cooperation on the part of the companies and the analysts was necessary, and thanks are therefore due to all who took part for making this ambitious field tour a success. In particular, the hospitality of the host companies was outstanding, and was very much appreciated by those in attendance.

TRIP B—Will Richeson

Dean Witter & Co.

Douglas Aircraft—Beckman Instruments

About 75 analysts left the Statler Hotel to drive through some of the housing developments of the Los Angeles area on the way to the Long Beach plant of Douglas Aircraft Co. Arriving at about 10:30 a.m., we were shown the huge Douglas C-133A turbo-prop military cargo transport now in production for the United States Air Force. Assembling in the fuselage of the C-133A, we were given the opportunity to inspect this military cargo transport, which is America's largest, and to hear a brief discussion on this project.

Detailed engineering on the model began in February 1953 and the first plane rolled out in February 1956. With the ability to haul a 50,000-pound payload for 3,500 nautical miles, the transport can fly from Los Angeles to New York with a ton-knot equivalent of 20 loaded freight cars. Basically a freighter, the C-133A can carry 200 people and can also be used as a hospital plane.

We were then treated to an inspection of the Douglas DC-8 jet airliner sub-assembly and final assembly lines in Douglas' entirely new one million square foot DC-8 facility. Unique Douglas' fabrication and assembly techniques were discussed by the guides. It was an impressive reminder of the thoroughness required to develop and produce this product for the jet age.

Following the plant tour and a luncheon provided by our Douglas hosts, short talks were presented by H. W. Strangman, treasurer; J. E. Biby, Jr., plant controller; J. B. Edwards, assistant to the chief engineer, Douglas Santa Monica, and Smith Newberry, assistant general manager of the Long Beach plant.

The DC-8 airliner will not be the first United States jet airliner in the skies, but, at the same time, it should benefit from the advances in technology before the design was frozen in 1955. The detailed performance characteristics of the plane presented by the Douglas executives included ability to cruise at 560-590 miles per hour, to fly from Los Angeles to New York in 4 hours and 40 minutes and from New York to London in 5 hours and 59 minutes.

Leaving the Douglas plant after luncheon, we drove to nearby Fullerton, long known for its orange groves, to arrive at the Systems facility of Beckman Instruments at

about 2 p.m. There we viewed displays of the company's completely transistorized data processing equipment which has been sold to such major customers as DuPont and leading oil companies. Key plant personnel briefly discussed this impressive equipment.

From here we were taken through Fullerton's busy and growing business center to Beckman Instrument's main facility. Following a plant tour of its assembly lines, we saw a display of various divisional products of Beckman Instruments.

Another highlight of the day's tour was an explanatory talk given by Dr. Beckman on his company. Through its major operating divisions and foreign subsidiary, Beckman produces and sells equipment for taking chemical and analytical measurements to broad markets, which include the petroleum and chemical processes and industries, among others.

The Shockley Semiconductor Laboratory, under the leadership of Dr. William Shockley, has developed a switching diode with interesting applications. The Helipot Division, which manufactures precision potentiometers, suffered in line with other electromechanical companies during the Government's economy drive in 1957. However, Dr. Beckman was pleased to report that orders for this division were about \$1 million during May.

The Spinco Division, well regarded for its instrumentation for medical research, clinical diagnosis and hospital application, has continued to do very well, finding an expanded market for its widening range of products. These include its centrifilmer, which produces completely safe, high-potency vaccines. In a number of its products and divisions, the company is the industry's leader.

TRIP C—Wilton M. Adams

California Bank

Fibreboard Paper Products— Ford Motor Co.

Fifty enthusiastic analysts gathered in the early morning fog for the 8:45 departure of the busses which transported them through the heart of industrial Los Angeles to the Vernon Board Mill and Carton Plant of Fibreboard Paper Products Corporation, the largest manufacturer of paperboard and cartons in the West. Upon arrival the group was greeted by a number of the Company's principal officers, including the Vice Presidents in charge of Finance, Marketing, Administration and Manufacturing, who came down from the Company's San Francisco headquarters especially for the occasion. Tables laden with coffee cakes, orange juice, coffee, etc., were a welcome sight to most of us who had cut short our breakfast to make the early departure.

The analysts were escorted in groups of four through the plant, where they saw the conversion of scrap and pulp into high-grade coated paperboard. The plant has a daily capacity of more than 190 tons of thirty different varieties of quality paperboard. The group found particularly interesting the very modern high-speed equipment for carton production and printing which makes possible the production of thousands of sizes and shapes of finished paperboard

cartons and qualifies the plant as the most diversified modern package producing facility in Southern California. The group watched cartons for some of the most famous national brand consumer products, including soaps, facial tissues, breakfast cereals and other trademarks familiar to every supermarket customer, speed off the intricate machinery faster than the eye could follow.

After the hour and a half tour the analysts enjoyed the 45-minute drive through more of the Los Angeles industrial area to the new California Golf and Country Club in Whittier, where we were the guests of Fibreboard for cocktails and a delicious luncheon served in a delightful California style dining room, facing a beautiful sunlit swimming pool.

Following the luncheon President William L. Keady introduced numerous members of his top management team and discussed, informally, the most recent developments in his Company, its finances, new products and planning for

the future; expressing considerable confidence in the future of the Company. Some of the new products about which the Company is most optimistic are tamper-proof packages for groceries, shipping containers, orange juice cartons, fibre tube forms for concrete pillar construction, and gypsum board, for which the Company has an almost unlimited raw material supply.

After a twenty-minute drive to the beautiful new Los Angeles Mercury Assembly Plant of the Ford Motor Company in nearby Rivera, the analysts were greeted by plant officers and then divided into groups of 12 and escorted through this ultra-modern facility. This 1,385,000 square foot plant, situated on a 200 acre site, has been in production only about 18 months and is devoted exclusively to the assembly of Mercury passenger cars, all on a moving line basis. It has a normal capacity of approximately 35 cars per hour, but at the time of this trip was operating at the

PUGET SOUND POWER & LIGHT COMPANY

Common Stock Dividend No. 59

The Board of Directors has declared a dividend of 34c per share on Common Stock of Puget Sound Power & Light Company, payable May 15, 1958, to stockholders of record at the close of business April 22, 1958.

FRANK McLAUGHLIN
President



INTERNATIONAL HARVESTER COMPANY

The Directors of International Harvester Company have declared quarterly dividend No. 173 of fifty cents (50¢) per share on the common stock, payable July 15, 1958, to stockholders of record at the close of business on June 13, 1958.

GERARD J. EGER, Secretary

Dividend Notice

JEFFERSON LAKE SULPHUR COMPANY

Directors at a meeting April 17, 1958, declared Common stock dividends of 1½% each payable June 10, September 10 and December 10, 1958, to shareholders of record May 9, August 8 and November 7, 1958, respectively. Bearer scrip to be issued for fractional shares.

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Secretary



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Two: an investment of more than \$260 million in new plant facilities by The Cincinnati Gas and Electric Company in the last 11 years.

Three: an impressive start in the last year on a quarter-billion dollars' worth of solid progress recently approved by Greater Cincinnati voters: slum clearance, street and sewer improvement, new expressway construction.

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rate of approximately 13½ cars per hour. The territory served by this plant encompasses everything west of the Rocky Mountains including Alaska and Hawaii. The analysts witnessed the assembly of the body from the floor panel to the finished product, which then proceeded through the Paint Department and the Trim Department to a point where the frame assembly meets the body assembly line. They then went back and observed the frame assembly from the bare frame structure to the completed chassis with motor; and finally the union of the chassis and the body, the installation of the front end, bumper assembly and interior trim. Approximately three and a half days are required for each car to complete the assembly cycle. The analysts were particularly impressed with the timing and coordination required to bring together the right parts in the right sequence, since each car is made on order from a dealer and is sold and delivered to him immediately upon completion.

Upon completion of the plant tour the group assembled in a conference room to hear brief talks by O. F. Marsal, Plant Manager, G. L. Boggs, Western Regional Sales Manager, and C. H. Pullman, Industrial Relations Manager, on the operations of this plant in particular and the prospects for Mercury Division of Ford Motor Company in general. The Managers of Production, Planning and Engineering were also present and all were subjected to numerous questions by the analysts.

A 45-minute trip into Los Angeles on the multi-lane Santa Ana Freeway brought the group back to Convention Headquarters right on schedule at 5:00, the result of considerable advance planning and outstanding cooperation on the part of our two host companies.

TRIP D—W. Jay Maguire

Daniel Reeves & Co.

Rheem Manufacturing— Hoffman Electronics

On Tuesday, May 20, 1958, a group of analysts left the Hotel Statler. They arrived at 9:30 at the Automotive Products Plant of Rheem Manufacturing Co. in Fullerton. There was an informal gathering in the company cafeteria to meet the officers and inspect the display of all Rheem's new products, including air conditioners, heaters, stoves, printed drums, as well as the automotive line.

Then followed a brief talk by Mr. A. Lightfoot Walker, President, telling of the reorganization of the company and the changes made in management. He introduced Mr. Carico, General Manager of the Automotive plant, and other personnel. A question period brought out many facts on Rheem's operations.

The group was then escorted through the recently completed plant which utilizes automation and continuous production flow to the maximum extent to increase productive capacity without loss of quality. They followed the leaf spring line from the trimming, forming, heat-treating and assembly on a belt conveyor. The plant produces a million leaf springs per year.

The bumper line shows the automatic treating of the

steel before it is fed into the 1,900-ton and 2,500-ton forming presses. From here they are carried to the finish-polish department, where they are automatically steel-buffed on specially designed machines. They then go on plating racks through the automatic cleaning and rinsing cycle and the nickel and chrome tanks. After inspection, the bumpers are carefully protected on shipping pallets for delivery to the automotive assembly plants in California and Texas.

At 11:45 the group boarded the bus for the trip back to Los Angeles to visit the Hoffman Electronics Co. We were entertained with an elaborate luncheon in the executive dining room, after which we assembled in the display rooms atop the new Engineering Building. Here the top management explained the goal of Hoffman and the progress made. Mr. H. L. Hoffman, President, explained the over-all position of Hoffman. Mr. Paul Bryant, Vice-President, told of the new developments in the Consumer Products Division. Mr. I. J. Kaar, Vice-President, related the possibilities that can come from Solar Energy, the virtually untapped source of power. Mr. J. D. McLean, President of the Hoffman Laboratories Division, told of the new developments in radar, communication, gyros and computers for the military.

Elaborate displays of the Hoffman equipment surrounded the room. There were various working models of equipment using solar energy, including the Vanguard missile and a new transistor radio. There were many models of the military electronic equipment showing the various components. Also, there was a display and demonstration of the new Stereophonic Hi-Fi for home use. At the conclusion of this period, the officers were available for discussion and questions, thus adding to the growing knowledge of this company.

The plant tour covered the extensive Engineering Department and the assembly lines of the various TACAN equipment in the main plant. The group then went by bus to the newly opened Laboratory Division, where the miniaturized gyroscopes and computers are made. Here they saw the white room where the gyros are assembled in air-conditioned cases under controlled conditions. Demonstrations of the latest precision equipment were given showing the efficiency and high degree of economy possible.

Both visits on this tour were extremely profitable, and the hosts outdid themselves to give the visiting analysts an insight into operations and the philosophy of management.

TRIP E—Augustus Slater, Jr.

Lester, Ryons & Co.

Kaiser Steel Corporation—California Institute of Technology

Our group of 83 Analyst Society members accompanied by several Kaiser Steel top executives made the 42-mile trip from the Statler Hotel east to the company's Fontana plant in short time on one of the area's newest Freeways on the morning of May 20. This is the only completely-integrated steel company facility on the Pacific Coast, where it has several basic factors underlying its successful growth. Young, aggressive management; close proximity to the

largest and most rapidly growing steel market in the West; operating in a steel "deficit" area with total consumption substantially in excess of western productive capacity; and with a very favorable low cost raw material supply position.

Featured during our visit were the several facilities now under construction which will increase capacity nearly 100% to three million ingot tons annually, making Kaiser the largest steel producer west of the Mississippi. The three new oxygen steel-making furnaces will go into operation later this year and have a productive capacity equal to the present nine open hearths, of which eight were in operation on the day of our visit. Capital cost per ton in the oxygen process is less than one-half of the open hearth and the operating cycle is only 40 minutes as compared with nine hours in the open hearth. The new 86-inch hot strip mill being installed occupies a building one-half mile long. The fourth blast furnace, now being constructed, is one of the largest ever with a capacity of 1,700 tons per day. The new continuous annealing and electrolytic tin plate mill will make this a major source for one of the largest canning regions of the country. An interesting feature of the plant is the careful handling of water in this semi-arid country. This commodity is even reclaimed from the coal in the coke ovens, and the plant's over-all supply is recirculated 40 or more times, the only loss being through evaporation. On completion of its current \$214 million expansion program Kaiser will be one of the lowest cost and most diversified steel producers in the nation.

After lunch, featured by talks by some of the company's top management team, our group made the hour's return trip, arriving at 3:00 p.m. at the California Institute of Technology in Pasadena, one of the many suburban towns in the Los Angeles area. Here we were given a very interesting introduction to the background and educational philosophy by which Cal-Tech is operated. Dr. George Beadle, head of the Biology Department, and Dr. Frank Goddard, a top man in the Jet Propulsion Laboratory, addressed our group in brief fifteen minute talks, but in so doing gave us an exciting glimpse of the new frontiers being probed by students and graduates in the realm of pure science. The Jet Propulsion Laboratory, commonly referred to here as J.P.L., played a leading role in the launching of this nation's first man-made satellite, and is a government owned research facility operated by Cal-Tech with a staff of 2,000 professional and technical personnel. This facility is located several miles from the main campus on an 80-acre site. In our conducted tour of facilities and activities on the main campus we visited the institute's million-dollar "computer center" used for teaching and research in mathematics, and analysis of systems ranging from missiles to the internal structure of molecules; the "Synchrotron" is a 105-foot circumference machine, or atom smasher, used for additional molecular study; the "Hydrodynamics Laboratory" conducts studies of underwater dynamics with respect to ships, submarines, torpedoes, etc. In the Chemical Biology Department we witnessed an experiment being conducted in the settling out of viruses in a test tube solution being whirled in a centrifuge at 56,000 r.p.m.!

This trip certainly made a lasting impression on the visitor to Southern California.

TRIP F—John M. Bush

Dean Witter & Co.

Lockheed Aircraft—General Controls Co.

Forty-two analysts departed from the Hotel Statler at 9:05 a.m., May 20, for a most interesting and enlightening tour of two of southern California's outstanding manufacturing facilities.

Arriving at Lockheed, the analysts were addressed by Robert E. Gross, Chairman of the Board; Dudley E. Browne, Vice President of Finance; Hall L. Hibbard, Vice President of Engineering, and J. F. McBrearty, Assistant General Manager. Mr. Gross outlined the company's over-all activity in terms of sales goals and business of the various divisions.

With respect to Air Force production, it was pointed out with justifiable pride that the F-104 Star fighter now held two very important firsts; namely, the altitude record for a plane taking off from the ground, and also the world speed record for level flight over a measured course. Air Force business in 1957 accounted for 32% of net sales divided among five models.

The Navy recently announced selection of the Electra prop-jet as its choice for anti-submarine warfare and has awarded a Research and Development contract of \$2,000,000 for adaptation of the Electra to this work. Navy planes and spares involving three models accounted for 22% of 1957 sales.

Mr. Gross also commented on the fact that of the six highest priority missile programs in the country, Lockheed is prime contractor on two, the Polaris for the Navy and the Pied Piper, an Air Force reconnaissance satellite. These projects along with rocket test vehicles and target systems accounted for about 23% of sales. Commercial planes and spares, possibly the most promising activity profitwise, accounted for 23% of sales.

The analysts were treated to an excellent color motion picture showing all the different phases of Lockheed's activity in missiles, military aircraft, nuclear reactor research and commercial aircraft production. Missile activity was very well covered with a series of action shots of the X-7 and X-17 rockets; the Q-5 target system; and interesting underwater testing of the Polaris.

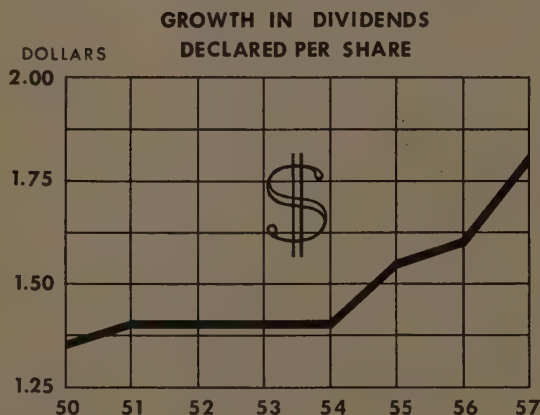
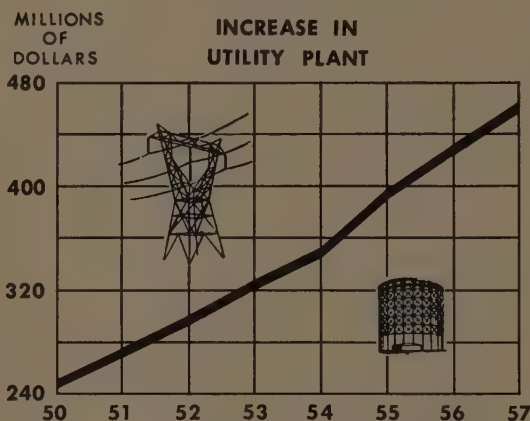
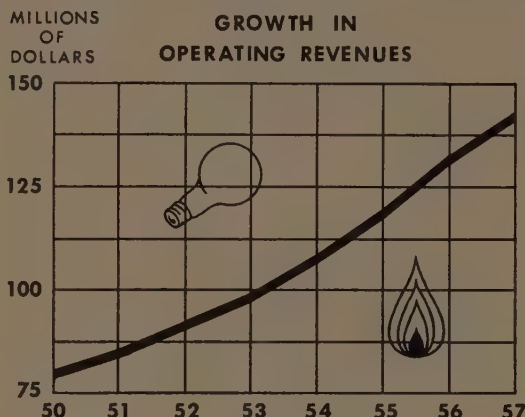
Following a question and answer period, the analysts toured the Electra production line. This was a most impressive sight since work was progressing rapidly on planes for Eastern Air Lines, American Air Lines and one plane for the Allison Division of General Motors. A good many questions were developed along the way and answered in detail by the company's spokesmen guiding the group. Much interest was exhibited in the turbo-prop engine and its apparent simplicity. Another interesting feature of the engine is the great saving in weight—less than one-half the weight of comparable piston engines. A five ton weight saving on the four engine assemblies starts a chain reaction of simplified design and weight saving in other components which eventually allows a 20% increase in payload.

From the Electra assembly line, the group moved to a hangar housing a mock up of the Electra showing decorative schemes for Eastern Air Lines and American Air Lines



BALTIMORE GAS AND ELECTRIC COMPANY

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and inside configurations for a hospital plane, a Radar Counter Measure vehicle and a Navigation Trainer. Also on display were charts showing the amazing number of hours of experience and testing performed by both engines and airframe.

Lunch in the Skyroom overlooking Lockheed Air Terminal was next, with company hosts seated at each table. During lunch, the group witnessed a landing of the Electra and observed firsthand its remarkably short ground run.

After a short ride of 15 minutes from Lockheed Aircraft, the group arrived at General Controls. Here, analysts in groups of five or six were assigned guides and conducted through the bustling activities of General Controls' diverse product lines. It is hard to grasp the number of parts and the work that goes into the design and manufacture of automatic valves, regulators and control devices until one sees such activity himself. Each analyst observed numbers of automatic lathes working on bar, rod and hex stock turning out hundreds of small parts per day. Large crucibles of molten aluminum were being used in the operation of large die-casting machines converting this raw material into intricate shapes. Long assembly lines bringing together the product of machine tools into precision products were observed and at one point the groups passed through a sort of air lock into a room kept at 72 degrees fahrenheit all the time to allow accurate calibration of room thermostats. New product development and engineering were also included in the tour, with the groups reassembling again in the company cafeteria for refreshing cold drinks. Here, Mr. William A. Ray, President, and Mr. Alvin W. Ray, Executive Vice President, addressed the group, going over 1957 results and adding a few comments on certain phases of 1958 operations.

The installation of machine bookkeeping in the recent past was discussed, pointing up management's determination for accurate control of costs at all times. Sales are expected to be up 15% over 1957 if business conditions stay as they are at present. A color film covering operations of the company at its various locations and some of the salient features of General Controls' service to customers was shown.

TRIP G—Harl Phelps

Pacific Indemnity Co.

Riverside Cement Company

Leaving the Statler Hotel in Los Angeles at 8:30 A.M. on Wednesday, May 21, a group of 24 members of the Society traveled via chartered bus to the Oro Grande Plant of the Riverside Cement Company, a division of American Cement Corporation, approximately 110 miles northeast of Los Angeles.

Upon arrival at Oro Grande the group convened in the conference room of the new two-story office and laboratory building of the company and, after refreshments, the visitors were taken on a tour of the building which houses one of the most modern cement control laboratories in the country. Complete with conventional facilities for the laboratory control work so essential to the manufacture of

portland cement, this laboratory also contains the most extensive assemblage of instruments for the X-ray analysis of raw materials, materials in process and finished product. By X-ray spectrographic analysis, laboratory technicians under the direction of Mr. Ed Curley, Chief Chemist, are able to perform accurate quantitative and qualitative analyses of samples in a period of only 22 minutes as compared with the approximate four hour time period required for conventional laboratory techniques.

The office building itself presents an interesting study in the various modern applications of structural concrete. The building, which is of lift-slab concrete construction, is featured by hollow gunite walls, decorative applications of colored concrete masonry and a "flying" precast spiral concrete stairway.

Following this, a tour was conducted of the company's waste heat power plant which was completed in 1954. Steam for the turbine generators is produced by five waste heat boilers and two fuel-fired boilers. The waste heat boilers operate on the hot gases emitted from the feed end of the plant's five 350 ft. long rotary kilns. Almost all of the power requirements of the Oro Grande Division are supplied by this power plant.

Luncheon was served in the Oro Grande Community Center Building, an abandoned school building which was purchased and completely renovated by the company several years ago. This building, which is maintained by the company, is now available to community groups for meetings and public events. Following lunch, the group was addressed by Mr. John M. Kinard, president of Riverside Cement Company. In addition to describing the production facilities of the company and the outlook for cement usage in the rapidly expanding Southern California market, Mr. Kinard discussed the financial status of American Cement Corporation and described the philosophy of management which brought about the merger of Riverside and Hercules Cement Companies. A question and answer period followed.

Returning to the plant, a conducted tour was taken of the cement manufacturing facilities at Oro Grande. This tour followed the flow of raw material from the primary crushing stage (current construction will provide expanded crushing, rock storage and raw blending facilities) through the secondary and tertiary crushing, and raw grinding mills. It also included an inspection of the company's five 350 ft. rotary kilns, some of the largest moving machinery to be found in any industry, in which the finely powdered rock is burned at 2700 degrees fahrenheit, producing cement clinker. (The company is in the process of removing a group of five older kilns in order to clear the way for future expansion and modernization.) The tour then took in the finish grinding facilities, portions of which were completed last year, and the company's new bulk cement packing, loading and storage installations.

Following the complete tour the group convened in the office building for refreshments and a final discussion period. Not only was this tour of value to those who previously had been unfamiliar with the cement manufacturing process, but it also provided an opportunity for viewing some of the Southern California landscape.

TRIP H—Harry Rossi

Occidental Life Insurance Co.

Consolidated Electrodynamics Corp.— ElectroData Division of Burroughs Corp.

Determining the proportion of today's profits that should be spent in research and development to buy a better future for a company's shareholders continues to be one of the most difficult questions facing management in the fast-paced electronics industry where product obsolescence occurs within a brief four-year period, Philip S. Fogg, board chairman of Consolidated Electrodynamics Corporation, told visiting delegates of the 11th Annual Convention of the National Federation of Financial Analysts Societies on May 21.

Seventy-five early rising analysts made the 17-mile trip from the Los Angeles Statler Hotel to CEC's 18-acre garden belt plant facilities in Pasadena, Calif., to hear a 9 a.m. briefing session by CEC's top management in the auditorium of the company's new \$1.5 million Research, Engineering, and Marketing Center. In an hour-long program they heard Mr. Fogg, President Hugh F. Colvin, and Board of Directors Finance Committee Chairman Franklin H. Donnell, discuss Consolidated's past performance, current operations, and outlook for the future as the company enters its 22nd year as one of the world's principal suppliers of electronic instrumentation.

Stressing the importance of a strong research and development and product engineering program, Mr. Fogg noted that CEC has consistently earmarked between 10 and 12 percent of its total sales dollar for this vital activity; that from 1942 through 1957, Consolidated has channeled \$15.5 million into its R & D program.

"Proof of the pudding" was visibly evident in the auditorium session where the newest products of the company's eight operating divisions were on display. Among these was a multi-track magnetic-tape recorder/reproducer of the type developed by CEC for missile and satellite tracking on the ARDC's Air Force Missile Test Center's 5,000-mile South Atlantic test range. Other exhibits included a new series of miniaturized, high-altitude electrical connectors; a revolutionary electronic-optical device called Plexicoder for use in aircraft and missile testing, which provides a telemetered air-to-ground link to furnish flight performance information; and "Ceramicite," the first entirely new material in the ceramics fields to appear in several years, a bonding compound developed by CEC which can produce pressure-tight seals and be used for coating high-temperature wire that will operate successfully at 1,000 degrees F.

Highlight of the product presentation, which was conducted by President Hugh F. Colvin, was a live demonstration of a recording-oscillograph magazine called Datarite which delivers completely developed and dried oscillograph records in less than a second to provide engineers with the results of dynamic-measurement tests even as the tests are being conducted.

Highly significant were Colvin's comments that of the \$4-million spent by CEC for R & D activities in 1957, 20 percent was spent for "sustaining engineering" to keep

products "fresh," while the remaining 80 percent was invested in new products and product development; that in 1957 20 percent of the company's business involved products released to manufacturing for the first time during that year and that 58 percent of 1957 new orders was for products which CEC had placed on the market since 1953.

During the lively question-and-answer period that concluded the a.m. session, Board Chairman Fogg declined to predict 1958 earnings. He did note, however, that CEC's new order rate began to pick up in mid-March, that currently new orders were approximately 112 percent of budget, and that the company should complete the year with a "respectable record if the beginnings of the modest up-turn, which we are now seeing, continue throughout the balance of the year."

On the Pasadena plant tour, that followed the auditorium meeting, visiting analysts viewed the company's Research, Engineering, and Marketing Center, and toured engineering and production facilities of the Systems, Analytical and Control Instrument, and Central Manufacturing divisions.

In the company's newly completed Monrovia, California, facilities, they toured the two 57,500 square-foot plants of the Transducer and (soon to be completely occupied) Systems divisions.

At the Transducer Division they watched the precision and painstaking manufacture of Consolidated's broad line of transducers, sensing devices which translate pressures, vibration, temperature, and other physical phenomena into measurable electrical signals. Here they also saw white-smocked craftsmen working with binocular microscopes, winding coils of wire a sixth the diameter of a human hair, and assembling miniaturized parts with screws so small that 15,000 of them could be contained in a thimble.

In the new Systems Division plant the touring groups inspected complete custom-engineered instrumentation and data-processing systems undergoing final quality control and performance tests prior to shipment. Typical of the systems they saw was a specialized mass spectrometer for use in the production of thermo-nuclear and atomic materials; high-speed, completely automatic data-processing systems for translating the mountains of data resulting

from performance tests of rocket motors, gas turbines, aircraft, missiles, and automotive engines—and systems for monitoring and controlling refining and petrochemical processes.

Completing the tour of Monrovia facilities, the delegates re-embarked in their buses for the six-mile return trip to Pasadena and a joint luncheon co-hosted by CEC and the ElectroData Division of Burroughs Corporation, in the latter's cafeteria.

After lunch the guests heard "lease-versus-purchase and a rapidly expanding market" posed as the electronic computer industry's two greatest economic problems by James R. Bradburn, Burroughs vice president and head of its ElectroData Division. The guests saw the Burroughs 205 and new 220 electronic data processing systems in production and operation.

In illustrating how one computer company has grown, Mr. Bradburn told the analysts that ElectroData "has experienced a sixteen-fold growth in personnel since January 1, 1954—giving rise to many management and financial problems."

Mr. Bradburn declared that, due to the high ratio of lease to sale, "the faster we grow—that is, the more computers we deliver—the longer we delay our payout. However, lease income will eventually build up to a point where ElectroData will contribute a major share to corporate revenue."

In further discussing the lease-versus-purchase dilemma, Mr. Bradburn said that many users "needlessly sacrifice the financial gain which the outright purchase of a computer system offers. Fearing equipment obsolescence, they lease the machines instead of taking advantage of purchasing benefits."

During their tour of the plant, largest computer production facility in the west, the delegates watched the assembly of the 205 and 220 systems. Located on a 10-acre site, the \$4-million plant is headquarters for some 1,500 employees working throughout the United States and Canada. The Plant was completed in mid-1957, with complete executive and marketing areas, engineering, training and purchasing facilities, and production areas.

Dividend No. 56

Interlake Iron Corporation has declared a dividend of 10 cents per share on its common stock payable June 30, 1958, to stockholders of record at the close of business June 18, 1958.



J. P. Hagan
Vice President & Treas.

Interlake Iron
CORPORATION
CLEVELAND, OHIO

Plants: Beverly, Chicago, Duluth, Erie, Jackson, Toledo

ELECTRIC BOND AND SHARE COMPANY

NEW YORK, N. Y.

Notice of Dividend

The Board of Directors has declared a quarterly dividend of thirty-five cents (35¢) per share on the Common Stock, payable June 30, 1958, to shareholders of record at the close of business on June 9, 1958.

B. M. BETSCH,
Secretary and Treasurer

May 22, 1958.



A dividend of seventy-five cents per share on the capital stock of this Company has been declared payable July 15, 1958, to shareholders of record June 13, 1958.

EMERY N. LEONARD
Secretary and Treasurer
Boston, Mass., May 19, 1958

Analysts saw the Burroughs 205 computing system in operation. The 205, they were told, is a medium-size computing system designed to handle both scientific and commercial problems. The quarter-million-dollar system can store up to 200-million digits of information when auxiliary magnetic tape units are incorporated.

Mr. Bradburn said the 220, newest of Burroughs' electronic data processing systems, offers for the first time the computational and data processing capabilities of so-called giant machines at half the cost. The general purpose system ranges in cost from \$325,000 to \$600,000.

The Burroughs E101, also marketed by the ElectroData Division, combines the operating simplicity of a conventional desk calculator with the automatic advantages of large-scale electronic computers, Mr. Bradburn said. A unique pinboard programming feature and its portability make the E101 especially valuable for brief routines required by scientists, engineers and accountants.

Officiating with Mr. Bradburn at the luncheon were, from ElectroData, Controller George Holmes, Director of Marketing E. S. McCollister, Director of Manufacturing J. B. Rice, Jr.; from Burroughs Corporation, Treasurer H. A. Lombard; from Consolidated Electrodynamics Corporation, President Hugh F. Colvin, Chairman of the Board Philip S. Fogg, Finance Committee Chairman Franklin H. Donnell, and Treasurer-Secretary Victor J. Pollock.

TRIP I—William F. Phillips

Wagenseller & Durst, Inc.

General Dynamics Corporation

At 9 a.m. on May 21, 1958, 55 analysts began, via a Pacific Southwest Airways charter flight, a memorable tour of the Convair and General Atomics Divisions of General Dynamics Corporation. At San Diego, just 40 minutes by air from Los Angeles, we were greeted by officials of the Convair Division and were welcomed by Mr. Frank Pace, Jr., President of General Dynamics. In his remarks, Mr. Pace stressed the company's philosophy of long-range planning and its emphasis on scientific research.

After watching a motion picture of the company's various operations and products we were taken to famed Lindbergh Field to witness the multiple take-off of three F-102 A's being delivered to the Air Force at Palmdale, California. It was a spectacular highlight of the trip. We then were conducted through the mock-up of Convair's new 880 jet transport, which, it was agreed, is a masterpiece of speed and passenger comfort. Following this we were taken on a detailed inspection tour of the assembly line of the company's new F-106 all-weather jet interceptor.

We were guests of the company for a delicious lunch, after which buses took us to Convair-Astronautics' soon-to-be-completed \$40 million facilities about ten miles east of San Diego. Astronautics is engaged in research, development, pilot production, and preliminary testing of the Air Force Atlas intercontinental ballistic missile. Our ever-thoughtful hosts provided refreshments at this point, and then we were taken to the facilities of the General Atomic Division. This Division is charged with the responsibility for General Dynamics' long-range interest in the field of

atomic energy. Here we saw the inherently safe TRIGA reactor, located at the bottom of a 20-foot, water-filled pit. This reactor is now being run through an exhaustive series of tests in preparation for its role as one of the Division's major research tools. The first of four major buildings of the Division's John Jay Hopkins Laboratory for Pure & Applied Science was occupied in August, 1957, and other buildings are nearing completion on this 300-acre site.

The tour was thorough and highly informative. Not nearly enough can be said for the courtesy and hospitality shown us by all of those at Convair who worked so hard to make this Field Trip such a success.

TRIP J—Sheldon M. Collins

Security-First National Bank

Litton Industries—Servomechanisms

Two busloads of analysts journeyed to the Servomechanisms electronics subsystems plant near the Los Angeles International Airport. There they were conducted in small groups through various engineering and manufacturing areas, including the environmental and missile laboratories where Rocket Engine Thrust Control Systems and Propellant Utilization Systems were undergoing manufacture and test. Also, they observed testing of the Barometric Altitude Controller, which has a sensitivity of plus or minus 2½ feet at sea level and is being used for fixed altitude flying to supply signals to an autopilot for high accuracy, constant barometric altitude flight operations and for automatic landings. Another exhibit consisted of a simulated cockpit instrumentation panel utilizing the company's Vertical Scale Instruments, which present important parameter information in an entirely new manner with a few easy-to-read integrated displays and eliminate many of the old "clock-type dials" to reduce pilot interpretation time and to conserve panel space.

At the conclusion of the plant tour the analysts were escorted to the company's conference rooms, which were lined with samples of other products of the company and where they were officially welcomed by Mr. N. E. Halaby, Vice-President in charge of Finance and Administration. He introduced Mr. W. W. Shannon, President of Servomechanisms, who discussed the company's past history and traced its steady growth from sales of \$7,000 in 1946 to a company record of \$23,600,000 in 1957. As for the future, Mr. Shannon stated: "Servomechanisms intends to stay in the military business and rather than decrease this effort, we plan to increase our military sales while at the same time increasing our activities in the industrial control fields. Our two component divisions, the Mechatrol Division, which manufactures a complete line of precision rotating components and is located in a new 55,000 square foot building in Westbury, L. I., New York, and our Special Products Division, manufacturing Magnetic and Vacuum film products in Hawthorne, California, are our best entree into the industrial control field. Although the majority of their sales are for military applications, the products manufactured in these two divisions are also applicable to the industrial field. As for our larger Subsystems Divisions here in Hawthorne, we intend to continue to design and produce

various subsystems that are an integral part of an over-all fire control system and bombing system.

"The year 1957," Mr. Shannon continued, "was one of consolidation in which we have reduced the number of facilities, as well as personnel, to save \$800,000 in our overhead expenses."

Mr. Shannon then introduced Mr. Ralph F. Redemske, Vice-President, Research and Engineering, who briefed the visitors on some of the work being carried out at SMI's Research Laboratory located in Goleta, California. Mr. Redemske discussed the company's Ionic Altimeter, which has been under development for several years. This instrument, starting where present-day altimeters leave off, has been designed to operate in the range from 60,000 feet to 250,000 feet. Since pressure is very slight at these high altitudes and common pressure altimeters are not practicable, the Ionic Altimeter measures density rather than pressure and then converts this physical phenomenon into usable electrical signals proportional to altitude. Other projects presently being investigated at SMI's Research Lab include a new type of semi-conductors to work under cherry red heat and a thermal energy converter for direct conversion of heat into electricity. Mr. Redemske stated: "While the activities of the Research Laboratory are primarily in the field of basic science, research is being aimed specifically in the direction of ultimate application to SMI's equipment and products. Realizing that tomorrow's airborne weapon system will be operating at faster speeds and in higher altitudes than ever before, we have placed our major effort and are now concentrating on devising new materials which will be capable of withstanding the extreme temperature environment of tomorrow's air-borne weapons. This research has taken the form of investigations into solid state physics, the creation of new materials, and the design of the molecular structure of materials to form these new compounds." It was noted that Servomechanisms Research Laboratory has been chosen by the Office of Naval Research as one of the most advanced in these fields and has been awarded a contract of long-range importance.

A question and answer period followed.

Then traveling back to Los Angeles on one of the new freeways and out to Beverly Hills, the party enjoyed a beef stroganoff luncheon at the headquarters of Litton Industries with Board Chairman "Tex" Thornton and other officials of that company. Brief talks followed describing Litton's products and objectives.

Mr. Roy L. Ash, Vice-President and chief financial officer, explained how the products and techniques, researched and developed by this electronics-based company, would reach increased domestic and foreign markets through the recent acquisition of Monroe Calculating Machine Company and the proposed purchase of Westrex Corporation. He also commented on the recently announced \$1,500,000 Culver City research and engineering center, and said that no venture to the open market for equity financing is contemplated, since any capital demands in addition to funds generated from present cash flow of around \$5 million can be satisfied through sale and leaseback of Litton's plants and properties, now 90% company owned. He mentioned

that the company has not used its full credit line and it is not felt that the need will arrive.

Dr. George Kozmetsky discussed the company's philosophy and achievements with respect to versatile small computers. Since only a small portion of a general-purpose computer's potential is required for most operations, Litton's compact machine can be produced at prices which are low enough to permit outright sale and minimize the need of leasing arrangements. Examples were shown of how the company has been able to greatly reduce the size of flip-flops (brain cells) for computers while at the same time effecting tremendous savings in manhours needed for their production.

Dr. Henry Singleton, head of the company's research, in a short, fascinating lecture explained the principles of an inertial guidance system which is not vulnerable to enemy jamming because it is self-contained and does not respond to outside power sources. With the aid of blackboard illustrations he described how a scientist goes about determining the philosophy of a machine and then can devise apparatus which will control its movements by means of electrical impulses or signals.

The analysts were then treated to a color movie of manned experiments conducted in Litton's unique space chamber, which was built in cooperation with the Air Force Office of Scientific Research and which is the only one of its kind existent in the free world. Included were demonstrations of how conventional objects react in an air-frictionless vacuum at a simulated altitude of 95 miles.

A conducted tour of the Beverly Hills plant followed, with the analysts divided into small groups, after which a conference room session was held, with company directors Ash and McDaniel answering questions put to them about Litton's future plans.

TRIP L—James R. Comeskey

Union Bank

Columbia Broadcasting System

The field trip here was made to the new Production Center located on Beverly Boulevard near Fairfax. The group toured (1) the Set Department, (2) Drapery Area, (3) Painting Area, (4) Camera and Crane Area, (5) and Studio Stages.

No provision was made for us to be in a sound studio at the time of rehearsal or broadcast. The principal activity at this Production Unit at the present time appeared to be the production of "Playhouse 90" and "Climax," which productions are supplied to the network. This trip was rather limited in scope, as there were no executives on the tour of the Unit who were qualified to answer the types of questions which would be asked by Financial Analysts.

Metro-Goldwyn-Mayer

At the Metro-Goldwyn-Mayer Studios we had a very fine lunch in the Studio Commissary. Mr. George Muchnic, Assistant General Manager, Mr. McKenna, in charge of Editorial work, and other executives were sitting with our group and made the luncheon most interesting with their conversation about the industry and their particular com-

pany. After the lunch, Mr. Muchnic gave a talk to the group, explaining the changes that were taking place in the industry and with particular reference to their corporation. He stated that the company had departed from its former policy of having only M-G-M productions made on their lot and now welcomed outside renters. Their own particular shooting schedule at present calls for about twelve big pictures a year. The corporation appears to be in a position to sell some fifty to sixty acres of their valuable property, as it is not now needed for production purposes. Mr. Shearer gave a talk and demonstration on their new camera and projection unit known as the M-G-M Camera 65. The picture produced on the screen from this particular unit appears to have considerable advantages over Cinerama from a layman's standpoint.

Following the demonstration we toured the Studio Property by bus, and saw many sets and technical devices of great interest to our group, and we momentarily saw some outdoor shooting of a picture having to do with the Northwest Mounted Police which is to be released for Television in the Fall.

Twentieth Century-Fox Film

The trip here was in charge of Mr. John B. Codd, Treasurer of the Corporation. Immediately upon arriving we toured the entire Studio property, consisting of some 300 acres, by bus. Mr. William Winter, of the Publicity Department, acted as guide, pointing out the areas of interest, including the oil development on the Property. Subsequently, we returned to the Commissary, where excellent refreshments had been prepared for us and where we joined other principal executives: Mr. Adler, Mr. Rogell, Mr. Herscher, and Mr. Schreiber. Mr. Adler made some very interesting observations regarding the planned budgeting, the training school for actors, and some additional information regarding what some of their more popular recent features are expected to gross.

Mr. Codd gave a talk about the financial position of the corporation, which had good earnings in spite of the so-

called general recession affecting the other industries, and the prospects for the remainder of the year 1958. Mr. Herscher reviewed the Real Estate situation with respect to the Studio Property, where it appears that in the neighborhood of 200 acres are no longer needed for picture work, and are to be developed according to a master plan involving some \$300,000,000 cost. Mr. Herscher brought out the point that, since a considerable number of our group were from New York, he would compare the prospects of the Real Estate Development to the idea of having some 200 acres in the Central Park area of New York at one's disposal, to be developed as one wishes.

TRIP M—Robert C. Crary

J. Barth & Co.

National Broadcasting Co.—Paramount—Warner Bros.

As might have been suspected, this trip through the studios was probably more notable for the local color that it provided to out-of-towners than for the money-making opportunities that it offered. Certainly though, it gave the visiting Analysts a real insight into the nebulous stuff of which money-making entertainment is made. Equally, it raised the question of how any money at all is made by the Producing Studios when it is seen how they are faced by highly uncontrollable (and sky rocketing) costs coupled with rock-hard competition from another entertainment media who are fighting for the public's leisure-dollar. I feel that it left the strong impression that the Moving Picture Industry is now fighting for its life against great odds.

A group of 31 "field trippers" boarded the bus at the Statler Hotel for the Paramount Studio where we were met by Messrs. Jack Ballard and William Ray of the Studio's permanent production staff.

It came as something of a shock to the group to see that on all of this thirty-two acres, on this particular day, there was not one single bit of picture-making activity. Once past the shock, however, the fast-moving walking tour



**COMMON DIVIDEND
No. 101**

The Board of Directors today declared the following dividend:

60 cents per share on the Common Stock, payable September 15, 1958 to stockholders of record at the close of business August 15, 1958.

The Goodyear Tire & Rubber Co.
By Arden E. Firestone,
Secretary

June 9, 1958

THE GREATEST NAME IN RUBBER

National Distillers and Chemical Corporation



DIVIDEND NOTICE

The Board of Directors has declared a quarterly dividend of 25¢ per share on the outstanding Common Stock, payable on June 2, 1958, to stockholders of record on May 9, 1958. The transfer books will not close.

PAUL C. JAMESON

April 24, 1958.

Treasurer

SOUTHERN NATURAL GAS COMPANY

Birmingham, Alabama

Common Stock Dividend No. 77

A regular quarterly dividend of 50 cents per share has been declared on the Common Stock of Southern Natural Gas Company, payable June 13, 1958 to stockholders of record at the close of business on May 29, 1958.

H. D. McHENRY,
Vice President and Secretary.

Dated: April 26, 1958.

around the Company's properties gave the Analysts a much more thorough understanding of the importance of the behind-the-scene physical aspects of picture making than would have been possible by walking directly into the shouting-crowd atmosphere of a "live soundstage." Messrs. Ray and Ballard, our hosts, offered every opportunity for question-asking and were most cooperative in their every effort to describe their business.

At 11:30 A.M. Mr. Y. Frank Freeman, Vice President of Paramount Pictures, in charge of the Hollywood operation, addressed the Analysts in the studio's projection-theatre. As one of the Deans of the motion-picture industry, who has seen every phase of its growth and development over the last 30 years, Mr. Freeman gave every Analyst a full opportunity to bring forth every question that might be on his mind about the current operations of the industry and even as to his guesses about its future.

This "bull session" was followed by a personally hosted lunch for us in the Studio Commissary. En route, Marlon Brando walked by and the two young ladies in our group almost swooned. (From hunger, they said). While lunch was being served, Mr. Freeman continued to answer other questions that were fired at him, and as the piece de resistance, introduced four of Paramount's up-and-coming young stars. These young ladies graciously seated themselves around our table in such a way as to offer the greatest amount of charm to those whose esthetic appreciation exceeded their appetites. Near the end of the meal the studio photographer took several pictures, and I dare say that these will make a "big hit" at home!

After lunch, we proceeded to the National Broadcasting Company's new, modern telecasting buildings in Burbank. There we were greeted by Mr. David Lipp, Assistant to the Manager of Guest Relations. Under Mr. Lipp's supervision we were broken into three small groups and taken through all the live telecasting facilities now used in all phases of the visual media.

The main thing that seemed to stand out through this trip was the great difference between the humanized, live-performer side of the media which appears before the cameras, and the highly complex and purely impersonal character of the vast electronic machines of all sorts used to photograph and reproduce the images that we take so easily for granted on our home sets. Complexity of this equipment (and its fantastic cost) were mute testimony to the scientific age in which we find ourselves.

One interesting human aspect of the tour included a minute inspection of the replica figure form dummy of Zsa Zsa Gabor being worked upon with skilled fingers by one of the costume designers. As one man said, "I guess this is as close as we will ever get to Zsa Zsa!"

After this walk through the physical facilities, Mr. Joseph Cuban of NBC's comptroller's office addressed the group in the studio's small conference theatre. Mr. Cuban gave a very complete resume of what NBC was achieving in its development of the TV broadcasting media and in so doing brought out the tremendous cost of this effort. It was somewhat difficult for our group to understand, I am sure, just where NBC expects to reap financial rewards commensurate to the cash outlay being consumed. More data

on this subject can be found in the RCA Annual Report.

With the bus at the door, it was only a 5-minute jaunt to the Warner Bros. lot, where we were met by Mr. William Rice of the studio's publicity department, and two of his assistants. It was definitely an early summer day, and by this time our group was very ready to stay in the bus as we toured an area of sets and sound stages roughly three times the size of the Paramount lot which we had covered by foot in the morning. That done, we had an opportunity to see some real-live picture making.

At 4:45 we made a final dash for our bus, which returned us to the Statler in time for reacquainting our parched tonsils with liquid beverage before the evening program began.

TRIP N—Ernest V. Stowell

Pacific Mutual Life Insurance Co.

North American Aviation

Early Wednesday morning, May 21, over 100 analysts departed by bus from the Statler Hilton Hotel in Los Angeles to spend a very instructive day as guests of North American Aviation's Atomics International and Rocketdyne Divisions and Southern California Edison. The analysts arrived at North American's Field Laboratory in the Santa Susana Mountains—30 miles west of Los Angeles and 10 miles from the headquarters of Atomics International and Rocketdyne plant in Canoga Park. Since this is a restricted area, attendance was limited to citizens of the United States of America.

The purpose of the trip was two-fold: first, to visit and inspect Atomics International's Sodium Reactor Experiment and Southern California Edison's generating station and second, to witness static test stand firings of liquid propellant rocket engines by the Rocketdyne Division of North American Aviation.

During the morning, the analysts visited the Sodium Reactor Experiment which occupies a 44-acre site within the 1600-acre Field Laboratory. The SRE is composed of a 20,000 thermal kilowatt nuclear power reactor, along with a heat transfer system.

A parallel steam plant was constructed by Southern California Edison with a designed capacity of 7500 electrical kilowatts. This steam plant can produce about 6500 electrical kilowatts with the reactor operating at its design power level of 20,000 thermal kilowatts.

The proposal to construct the SRE and accompanying experimental program grew out of several year's study at Atomics International. After the examination of many concepts for power reactors, it appeared that the sodium-graphite reactor appeared favorable for development. The use of liquid sodium as a coolant was desirable since high temperatures could be sustained at atmospheric or very low pressures. On June 25, 1954, the contract between Atomics International and the Atomic Energy Commission for this program was undertaken. Less than three years later, on April 24, 1957, the reactor went critical and was able to sustain fission. On July 12, 1957, the first electricity was produced by this system. For the first time, electricity pro-

duced from a non-military atomic reactor flowed through the system of a private utility.

The reactor building contains about 10,000 square feet. Adjacent thereto is the generating plant of Southern California Edison. The reactor and other "hot" or radioactive portions of the system are buried underground. The reactor core is six feet in diameter and six feet high. To protect against radiation and provide access openings is a six-foot thick high density concrete shield.

The Southern California Edison Company plant is a 7,500 kw modern out-door type steam electric station as similar to a conventional steam plant as the special requirements of the reactor-heated system will allow. It consists generally of a liquid metal-to-water, once-through steam generator, a 3,600 RPM package turbo-generator unit mounted on a 7,000 square foot two-pass surface condenser. The condenser is cooled by means of an induced draft cooling tower. A three-phase power transformer raises the generator voltage to 69 KV for transmission of the electrical energy into the Edison system. The switch gear is all metal clad.

Experimentally, the most important piece of equipment is the steam generator which links the familiar steam cycle with the cooling cycle of the reactor. It is believed to be the first generator of its type ever used in commercial operation. Such a device is essential to the successful generation of electrical energy from all types of sodium-cooled reactors.

This unit is constructed with double-concentric tubing with mercury in the region between the tube walls to monitor for leaks prior to sodium and water coming in contact. In order to meet all the contemplated reactor experiments, it and the entire plant were designed to utilize up to 30,000 kw of thermal heat and to accept elevated sodium temperatures.

At lunch time, the analysts were briefed on the history

of rockets and missiles, the reasons for the selection of the Santa Susana site for field testing of rocket propellents, and a general description of rocket propellents themselves. North American's Rocketdyne Division operates the free world's largest rocket engine test center. Situated in the 1600-acre Field Laboratory are six test control centers with a total of eighteen test stands. Here are tested rocket engines for the Army's Redstone mid-range and Jupiter intermediate-range missiles, and the Air Force's Atlas ICBM and Thor IRBM. Various associated component parts are tested as well.

The site of the Field Laboratory was selected for its proximity to Los Angeles and the protective features of its rugged terrain. Each test center is isolated from the others so that firings at one center will not affect operations at the others. The control center of each test center is situated some 300 feet away from the test stands. Here are hundreds of dials and indicators which measure the performance of each firing. The time interval is very short—perhaps 20 to 90 seconds, so the testing equipment must be very accurate and sensitive. The test stands are derrick affairs and the rocket engine is placed in vertical position so the flame is directed downward. About twenty feet below the rocket exhaust is a right-angled elbow to direct the flame away from the test stand. The rocks against which the flame is directed are charred and gutted to a distance of 200 to 300 feet.

About 1200 feet from the test stands are observation points. The roar of the rocket engines from that point is deafening. Even the smaller rocket engines rocked the very earth.

The exhaustive testing and information gathering therefrom by skilled technicians gave great reassurance to all present about the solidity and quality of this phase of our missile program. Indeed, this was a fitting conclusion to a most interesting and instructive field trip.

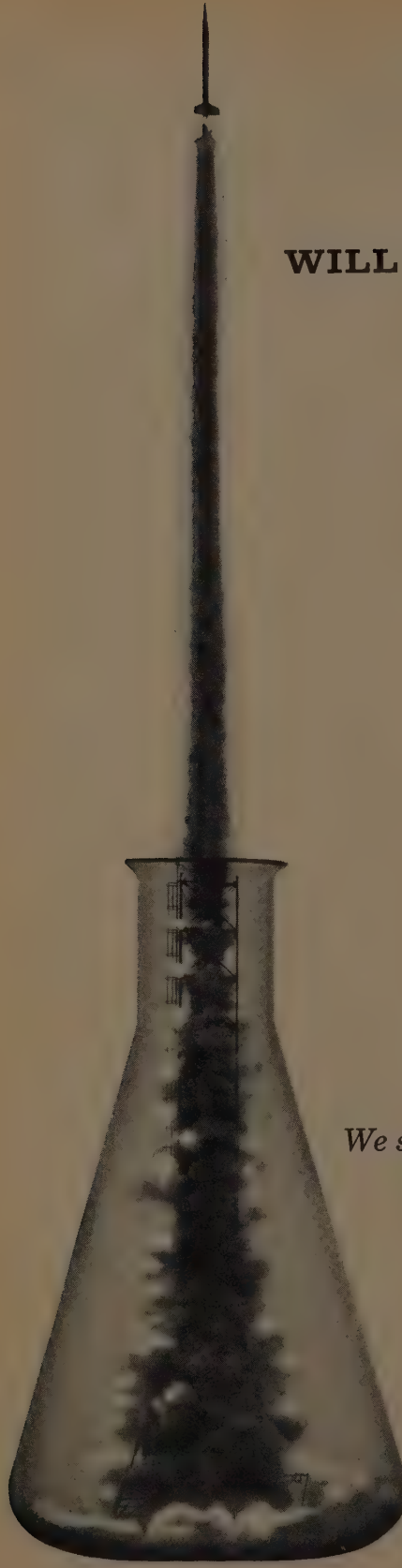
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	1957	1947	1937
Utility Plant at original cost	\$74,103,042	\$28,571,853	\$18,329,407
Long-term debt	31,966,000	13,202,000	10,795,000
% Debt of utility plant	43.1%	46.2%	58.9%
% Debt of capitalization	54.0%	56.2%	65.2%
Preferred stock	7,786,850	3,475,000	2,961,000
Common stock and surplus	19,480,888	6,823,786	2,791,745
Operating revenues	15,063,037	4,808,620	2,458,823
Net income	2,212,714	720,518	449,786

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The Special Train Trip

BARBARA CHIPMAN JONES

(Written in sincere thanks to the five great railroads who carried the Analysts Special Train on a memorable trip: Burlington, Rock Island, Santa Fe, Southern Pacific and Great Northern)

THERE IS NOTHING LIKE A TRAIN

There is nothing like a train,
Nothing in the world.
We won't go by bus or plane
When we're travelling 'round the world.
Married couples went insane—
One lost his denture down the drain—
We were lucky with the rain—
We blew fuses on the train—
A lady hobbled on a cane—
With our ulcers we had pain—
But if we live to do it again
And have our wits as well as a brain,
We'll go by train!

(with apologies to "There's Nothing Like a Dame")

—B. C. J.

THE NIGHT before getting back to Chicago, this song, which I cooked up at six a.m. in Seattle, was sung all over the train by Jack Foster of Philadelphia and shall be the backdrop of a brief account by an Analyst's wife.

For the benefit of those who have never made the trip on a Special Train for Analysts, we all had the same rooms, car and porter for the "Around the World in Eighteen Days."

Our porter was out of this world! Every morning he'd rap on our door and give the outside temperature report: "No topcoats today, Mrs. Jones—going to be a warm, clear day." His name was "Homer," and if it hadn't been, I'd have called him just that.

Our compartment soon became to us "our little home in the West."

I should also like to say that we girls were much in favor of being greatly outnumbered by all the very distinguished and handsome *male* Analysts.

TUESDAY, MAY 13TH, CHICAGO

The ladies were invited to go with the boys on a special train provided by the Chicago & Western Indiana Railroad for a tour of the industrial district. The high point of this was the "Hump," where freight cars from all over the country are classified and go scooting down the right tracks—don't ask me how. Virginia Bretey and I got very nosy about the whole thing, as we didn't understand how the cars separated at the crucial moment. A kindly gentleman from the Railroad said it was not done by mirrors, but that a workman poked a connection, etc. Very fascinating.

5:45 p.m. Very fine party by Chicago Analysts at Union

League Club. Aside from the fact that a few Analysts' wives got into wrong elevators and landed in the holy of holies (including an embarrassed yours truly), all went well indeed.

9:30 p.m. Got aboard Train—via Burlington—dashed to Vista Dome Car—left in starlight and viewed Chicago's beautiful skyline.

WEDNESDAY, MAY 14TH, KANSAS CITY

7:30 a.m. Ladies (this, after all, is the women's trip that is being written) had a very fine breakfast at the President Hotel. We were greeted most graciously by a very attractive group of women (wives of Kansas City Analysts). An inspiring talk was given by Mrs. Marabelle Ebel, President of Women's Kansas City Chamber of Commerce. It left us all with a feeling that there is a great spirit of progress, culture and good Americanism here.

On our subsequent trip around the city and suburbs it surprised me to see how rolling the countryside is.

Delicious lunch at Carriage Club. More superb hospitality.

Dinner for all at the President Hotel. Again the Kansas City group outdid themselves. Divine food, exceptional entertainment: a barber-shop quartet sang, and one of the funniest men I've ever heard, Guest Speaker Tom Collins, had the whole crowd convulsed for twenty minutes. We all had a whale of a good time!

10:30 p.m. Left Kansas City via Rock Island. Au revoir, we hope to come back!

THURSDAY, MAY 15TH, FORT WORTH — DALLAS

Deep in the heart of Texas—oil wells—a feeling of a newly developed country—plus stores—Oh, Neiman Marcus! At this fantastically fine store we really saw how it can be done for us shoppers. The saying "Made only for or by Neiman Marcus" is only too true. Went so far (which scared the daylights out of my husband) as to open a charge account. Enough said. Delicious lunch and fashion show at Neiman Marcus.

Fort Worth great competitor of Dallas. It's all right with me.

5:30 p.m. Dinner at Ridglea Country Club. Here Texas really did it up brown. Entrance foyer lush with tropical plants, fish pool and glamour. Big reception room walled in plate glass overlooking two swimming pools and patio.

Incident: The windows were so huge and vista therefrom so realistic that three Analysts tried to walk through them—glass in hand, of course!

11:59 p.m. Boarded the Santa Fe (nobody lost yet).

En route on train all day. Drip drying of clothes could be heard all over train, in fact this diary could well be called "Drip Dry." I was a little worried at first for fear a small stream might flow into the Dave Williams' (Detroit) compartment next door, but either through politeness or because they liked to get their feet wet, no complaints were ventured. However, I'm not so sure there wasn't a little retaliation here, as several women tried pressing their Poppa's pants with travelling irons, thereby blowing all the fuses used for electric shavers.

Now, friends and Analysts, it's at this point that I have to hold back my enthusiasm and remember that the Joneses are conservative Yankees, because the Santa Fe trip was a wow! To be sure, they had one of the great wonders of the country as a background to show us, but even so, they did a superb job! In the first place, they had a whole string of attractive and interesting men—and I mean interesting in the character and informed sense—who talked to us and answered hundreds of questions in the Dome Car all day.

As I'm just a simple woman, Mr. H. Parker, Santa Fe Labor Placement Manager, told me the things I wanted most to hear: everything from the Indian language to history and geography of the vast New Mexico and Arizona lands we were passing through.

7:00 a.m. In Dome Car. The plains of Northern Texas—12,000 producing oil wells—large industrial center of agriculture and livestock—vast plains of plowed fields as far as the eye could see. Looked much like the cornfields of Indiana, except the soil was not as rich and irrigation ditches ran throughout—for dry season ahead.

Terrain changed occasionally, with much sagebrush and desert-type of growth everywhere in sandy soil. The train climbed steadily—interesting that this seemingly flat panhandle was actually from 3,000 to 4,000 feet in altitude.

Saw a ten-foot boat in someone's front yard! Where in God's name do they use it? Also, a big jack rabbit—comment from Santa Fe speaker: "Texas rabbits are so big they ride them!"

Middle of the morning reached New Mexico. Land desert in type—practically no trees, windmills for water supply, very few plowed fields and farms.

11:00 a.m. Saw our first mountains, strange flat tops with sides cut sharply by erosion. Lovely patches of yellow desert flowers and lots of spikey white ones similar to but daintier than the yucca, grew in profusion.

11:15 a.m. Fort Sumner Valley, where Kit Carson rounded up the Indians. Some adobe houses; mile upon mile of sage and cattle grass; much yucca. Saw an antelope close to train.

1:45 p.m. Mountainair, New Mexico. Altitude 6,499 ft. Countryside now rolling, soil reddish and rocks in flat layers.

3:45 p.m. Uranium territory. Santa Fe speaker (Mr. T. A. Evans, Chief Mining Engineer) told us New Mexico has an area of 50 square miles that produces 68% of the known uranium ore reserves of the United States, that the first ore there was discovered by an Indian named "Paddy",

and that the Santa Fe transports all the ore from this section. Showed us a small bottle of uranium, deep yellow in color. (Analysts showed no desire to handle this "hot" sample!)

Reached Indian Reservation. Mr. Hubbel Parker, Santa Fe Labor Placement Manager, took over the mike. Said Santa Fe is largest employer of Indians in the country. Also, Navajo Indians have 25,000 square miles of land, which is about the size of West Virginia!

Passed Acoma Indian Village—adobe houses and many homes built in the face of rocks, practically prehistoric; this tribe sticks to home base.

Rocks in this terrain are sandstone capped by lava, in fact, for miles upon miles volcanic cones sprinkled the land, with much evidence of lava everywhere.

Sorry, folks, can't give more here, as there is too much to come.

SATURDAY, MAY 17TH, GRAND CANYON

Now here is where I really have to restrain myself.

7:00 a.m. We went to El Tovar Hotel for breakfast. Who can eat at a place set on the rim of the Grand Canyon, and with weather absolutely perfect? Cameras came out en masse. Analyst's comment: "I wish to God I had some Kodak stock!"

No picture or description can possibly give you the majesty and awe-inspiring beauty of the Grand Canyon. My advice is, see it for yourself before you travel to Europe or to South America. You've got something unbelievably wonderful right at home. (See Santa Fe for transportation!)

9:30 a.m. A group of intrepid souls signed up to go by mule down the Canyon! My congratulations to these venturesome and courageous Analysts! (The temperature in May rises to 95 to 100 degrees down there.) P. S. They all survived.

The rest of the group toured the Canyon by buses—not the whole 217 miles, of course.

We were so fortunate as to have Bill Parker as our bus driver and guide. He was born in this territory, has written a book published by Macmillan, "The Mestizo," and was, to put it mildly, the perfect guide.

High points of interest:

Hopi Point, named for Hopi Indians, altitude 7,071 feet—one can see 75 miles, 10 miles wide, 1 mile deep. Rio Colorado River flowing below (60 feet deep), wild life at Canyon bottom, rattlesnakes, lizards, etc.

Pima Point, 6,750 ft. altitude. Could hear distant rapids of river. Juniper trees everywhere, heavy fir type with deep golden hues which are caused by a parasite called "desert mistletoe."

Stopped for refreshments at Hermit's Rest. We also saw the Painted Desert—gorgeous view, just as colorful as can be imagined.

Flowers en route: Indian paint brush and mustard mountain phlox. Mule story by Bill Parks: "It seems that mules were held in great store by the early settlers and prospectors. They, the mules, are sure-footed in the Grand Canyon trails and very, but very obedient. One day Captain Hance found that his hobbled mule had gone and the ropes were cut. He looked around and found a group of outlaws hav-

ing a juicy barbecue and saw the mule's hide hanging nearby. So he called out, 'Whoa Mule!' and all the outlaws choked to death!"

5:30 p.m. Cocktails at Angel Trail Lodge, courtesy of the Santa Fe.

We all rushed to our "little home in the West" that was sitting at the Grand Canyon station, and donned our cocktail garments. Off to the party, fifteen minutes later. (It's wonderful what you can do in a hurry.) The Santa Fe had arranged the most dramatic affair I've ever witnessed. Against a background of the Grand Canyon, to the beat of drums and chants, Indian performers in magnificent costumes danced for our benefit. It was so startling and thrilling a climax to a terrific day as to be breath-taking, to say the least. I think all the Analysts came away with a memory worth storing for a lifetime.

Dinner at El Tovar Hotel—delicious—goodbye, Santa Fe—may we all see you again!

SUNDAY, MAY 18TH, LOS ANGELES

In the morning—Hotel Statler. Back to civilization, or something. Oh, that first *real* bath, the first for most of us in five days! Practically everything we owned in the way of outside garments was sent immediately to the dry cleaners, to such an extent that they had to return the clothes to us in two shifts.

After lunch by the swimming pool in the patio in the center of the Hotel, a trip to Disney Land. The one and only Disney and his staff at their really greatest. A child's dream of fun and an adult's complete delight. One could spend days there and hardly touch it, and then want to start all over again. Here we had Fantasyland, Tomorrowland, Frontierland and Adventureland. Let your imagination run riot and it won't cover by five per cent what is offered: Miniature trains (big enough to hold Analysts) with background of tunnels, small villages, and countless other scenes. Old type of paddle wheeler boat took us on waterways past Tom Sawyer's Island, Indian Villages, et al.

Do you want to see villages as they were in the good old days, as well as have a ride in a horse and buggy? Well, anything you may ask for was there in a superb imaginative little world.

In the evening, Directors' Dinner in lovely dining room overlooking the Patio, with a moonlight effect, tropical planting and well-lit pool. All was a very gay and interesting party. Saw old friends from all over the country.

MONDAY, MAY 19TH

9:00 a.m. All the ladies of the train went to the Hotel beauty shop, and threw it into a panic as they arrived en masse to have their hair washed, of course! Telephone calls were sent out all over Los Angeles to get in extra operators, and did they go to town!

11:00 a.m. Trip Z—en route—by bus to Farmers' Market, one of the greatest places in the world! Strawberries the size of peaches, 14-inch asparagus, pure green to the bottom of stalk; jewelry, pottery, flowers, leather goods, metal accessories, from all over the world (to put it briefly), as well as the most delicious foods at restaurants

serving out in the open. Much shopping done by all hands.

Here the party split up, and I was so fortunate as to go to the fascinating studio-factory of the thirty-five-year-old industrial designer of ceramics, Sascha Brastoff (backed, I believe, by the Rockefellers). He has a modern feeling with the beauty of classic influence such as the Chinese. It was a most fascinating and informative experience.

5:30 p.m. Back for cocktail party given by Pacific Coast Stock Exchange. Orchid corsages for all the gals—enough said!

TUESDAY, MAY 20TH

Another marvelous trip! The countryside was simply ablaze with the most gorgeous flowering shrubs and flowers imaginable! Passed one fascinating town built on a steep hillside and the whole development was restricted to look like the south of France—all red-tiled roofs, garages largely on top floor, beautiful view of the Pacific Coast.

En route: Wayfarers' Chapel. Built almost entirely of glass, designed by Lloyd Wright, son of Frank Lloyd Wright. It was of a most inspiring and spiritual architecture, perfect for the setting and filled with beauty.

Marineland—Barnum and Bailey, take note! Here was the most fantastic show of "Bubbles," the only whale in captivity, some fabulously trained porpoises, and the world-famous sea lions. They talked, sang, high jumped and all but performed as humans. I wouldn't have believed it possible.

Back for cocktails—hosts: The Garrett Corporation, Kaiser Industries Corporation, and the Union Oil Company of California.

Had dinner in Los Angeles Mexican Quarter. Joe Livingston, widely syndicated financial editor, and his wife, Rosalie, got together a congenial group and we all had a marvelous time.

WEDNESDAY, MAY 21ST

Wednesday morning. Here, I admit because of weakness of character, I skipped the women's trip. A little drip dry, a nap, packing again for the train, etc. (Our luggage had to leave at 4:00 p.m.)

5:30 p.m. Cocktails given by the Public Utility Companies. Very fine.

Annual Convention dinner. Note: The Los Angeles women were an outstanding group of hostesses who were most gracious and lovely in every way. Mrs. Hartley Smith, wife of the incoming National President, was all one could hope for, as were many others. The dinner was delicious. The timing was good and the speeches interesting. Gil Palmer's sense of humor carried it off just right. The guest speaker, Frank Pace, Jr., President of General Dynamics Corporation and ex-Secretary of the Army, was a most forceful and inspiring speaker. Completely without notes, he held the big crowd spellbound by his extensive knowledge, patriotic and spiritual outlook, and his outstanding personality.

All aboard! Special Train left Los Angeles 11:00 p.m. via Southern Pacific Lines.

THURSDAY, MAY 22ND, YOSEMITE

7:00 a.m. Arrived Fresno, California Hotel for breakfast 8:30. Buses left for trip into rugged Yosemite National Park (and I mean rugged!). It was cold, brother, how cold! — topcoats, raincoats (it showered), snow was on the ground, bears were around (if they weren't smart enough to stay hibernating), and we went through the great Mariposa Grove of mammoth redwood trees. Awe-inspiring!

Lunch at Big Trees Inn. We then descended to Yosemite Valley and saw the magnificent Falls in their full glory. The winter had been hard, with great snowfall, so the Bridal Veil Falls and others were at their peak. Cameras were going to town and the sun came out to help the colorful view.

Dinner at the unusual and charming Ahwahnee Hotel.

8:00 p.m. Fire Fall: Each night during the warm season the management of Camp Curry has a huge bonfire built on Glacier Point. The burning embers are pushed from the Point above and this cataract of fire falls nearly 900 feet to a barren ledge below. Breath-taking!

11:30 p.m. Leave aboard Train via Southern Pacific.

FRIDAY, MAY 23RD

Arrive Oakland 7:00 a.m. Breakfast 8:00 a.m. at Claremont Hotel. Most interesting and unusual establishment on a hillside—white, rambling, magnificent gardens.

I took the bus straight to the St. Francis Hotel, skipping the women's trip, as I wished to have a day in San Francisco to shop! Who wouldn't?

I. Magnin's, Gump's, Baldocehi's (most famous florist on the West Coast), China Town, etc. Bought myself a long-wished for Chinese dress and other impedimenta. In fact, spent the whole day revisiting old haunts.

The Analysts were guests of the Western Pacific for a surprise cocktail party aboard boat and toured the San Francisco harbor. We missed it, but it was, we understand, a beautiful trip and a most enjoyable time!

Dinner at the Pete Avenalis'. They have a fascinating house overlooking the Golden Gate Bridge and gave a big group of us a terrific time. Many thanks.

SATURDAY, MAY 24TH, TOURING THE NAPA VALLEY WINE COUNTRY

9:30 a.m. We went aboard buses as guests of the San Francisco Analysts for a tour of the Great Wine Country. What a day! Each busload visited two of the intriguing wineries. We saw Louis M. Martini's and Beringer's. Most of these vineyards are family started and continued for generations. Their equipment and vineyards are fabulous.

Luncheon—unbelievable—huge tables ready for our whole crowd, every kind of California wine on tap—all the group of Analysts and wives soon feeling no pain.

Scene: My husband climbed aboard the bus, as did many others, hiding a partly used bottle of wine. Loud cheers from bus groups!

Later we were on our own and most of the train group started off with cocktails, at the "Top of the Mark." The night was perfect—no fog—just the magnificent view of the whole of San Francisco, bejeweled with twinkling

lights, the great bay, its two bridges glittering like diamond necklaces below us. On to dinner with a Philadelphia group to one of the many perfect restaurants.

11:00 p.m. Back to the Mark Hopkins for one last view. Practically the whole train crowd were there. Much table hopping!

SUNDAY, MAY 25TH

Free for a few hours. Joneses and dozens of others covered the waterfront, literally. Fisherman's Wharf et al. All the gang seen riding cable cars and taking pictures like mad—more fun! Try sending your relatives two or three live turtles from San Francisco!

3:00 p.m. All aboard via Southern Pacific.

MONDAY, MAY 26TH, PORTLAND

7:15 a.m. Guests of Georgia-Pacific Corporation for breakfast! Brace yourselves—gin fizzes! They literally rolled out the red carpet—dozens of attractive young girls pinned red rose corsages on the Analysts' wives (the rose is Portland's flower) and a rose for each gentleman.

Interesting trip through Portland for ladies, where we lost, temporarily, six of them. At this point let's confess, the train crowd was getting slap-happy with travel, so it was no fault of Portland.

1:15 p.m. Leave Portland.

5:00 p.m. Arrive Seattle. Party divided between Olympic and Benjamin Franklin Hotels.

5:45 p.m. We were delighted guests of Seattle Analysts for cocktail party at Olympic Hotel.

TUESDAY, MAY 27TH

Now here again I must take my hair down. for the Seattle women were utterly charming and lovely hostesses in every sense of the word. I was so fortunate as to have a most superior bus driver and guide, as well as superb hostesses, Mrs. Blanchett and Mrs. Meyer. They really took us over the fascinating harbor, locks, University of Washington, beautiful homes, Lake Washington and its environs. Lunch at the Tennis Club, right on the Lake. What a gorgeous place! Mrs. Blanchett asked some of us back to her lovely home on the lake. It was a gratifying experience, because until one sees how people live in a city it is an incomplete picture.

At this point I'll have to say that Seattle is a place I'd like to live in. That is my advice to my young teen-agers. Enough said.

5:45 p.m. A great and memorable dinner at the Olympic Hotel. This was given by a comprehensive and fine group of businessmen of Seattle. It was most enjoyable in every sense of the word. Au revoir—hope to return.

11:30 p.m. Leave Seattle via Great Northern.

WEDNESDAY, MAY 28TH

7:00 a.m. Arrive at Wenatchee, Washington. Have breakfast at Cascadian Hotel.

8:30 a.m. Board buses for tour of Rocky Reach Dam, Chief Joseph Dam and the great Grand Coulee Dam. A fabulous experience. Again, no pictures can possibly express the enormous project that is here. A good part of the State is having its face lifted as far as irrigation and

electric power are concerned. It was most awe-inspiring and, in a way, frightening. A lady Analyst said: "What would happen to this part of the country if a bomb were dropped here?" What, indeed! The irrigation project is immense. We saw the results of same—lush, verdant fields that would have otherwise been wastelands.

THURSDAY, MAY 29TH

Via Great Northern—headed home! Here the Great Northern put on a terrific job! Wonderful men from their company, Mr. Turnburke, Vice President; Mr. Finley, Vice President and Traffic Manager, and many others; fancy club cars, two dining cars, etc.

The Great Northern showed very beautiful films: (1) Great Northern Railroad route from beginning to end, (2) Glacier Park (Great Northern is the only railroad that stops at the Park), and (3) North Dakota—all about the whole state. Questions were ably answered by the top brass.

Incidentally, at 4:00 a.m. on that same day, about fifty of us got up to see the Glacier Park from the Dome Car. Some were in night gowns or pajamas, as the case might be, coat over all, no shave and certainly no powder and lipstick. I just wish you all could have seen the expression on the porters' faces when we trooped through the cars before dawn! I'm sure they thought us a most extraordinary group of queers at least!

But the Great Northern crashed through! We were terribly hungry for coffee and breakfast, and as we got through the scenery at 6:00 a.m., our dining car was ready perfect—its shining equipment of spotless tables, perfectly dressed waiters, and a most gracious head waiter who gave us coffee and offered breakfast at 6:30 a.m.! What more can you ask?

Personally, I feel humble after the beautiful job that has been done by these, our great Railroads of this country. I also feel that it is time that we, the people, rise up and say to our Congressmen, "How about being fair to this unbelievably fine transportation system so necessary for daily living and national defense!"

Well, we are back to the last roundup. The Great Northern entertained us in a most marvelous way—the top brass was terrific! and I loved meeting them!

Thanks, everybody, for a wonderful time.

"There's nothing like a train,
Nothing in this world!"

Special mention should be made of Bob Caird, Travel Agent for the C. B. & Q., who really ran the show in many ways. It was he who counted noses, answered questions, took the brunt of the inevitable complaints, and oversaw that luggage for a huge group got back and forth from train to hotels. He is a great fellow and all hands give their sincere thanks for his part in making the trip so successful!



MORE THAN \$1/4 BILLION SALES

from serving . . .

- Transportation—Construction
- Agriculture—Petroleum
- General Industry and Government

with . . .

- Axles—Transmissions
- Leaf and Mechanical Springs
- Bumpers—Cushion Springs
- Brakes—Forgings—Stampings
- Grating—Universal Joints

newly added products . . .

- Torque Converters
- Executive Aircraft

DIVIDEND NOTICE

The Board of Directors has today declared a regular quarterly dividend of fifty (50c) cents per share on the Common Stock of the Company, payable June 10, 1958, to stockholders of record at the close of business May 16, 1958.

A. A. Finnell, Secretary

April 21, 1958

ROCKWELL-STANDARD CORPORATION
Coraopolis, Pennsylvania
(formerly ROCKWELL SPRING AND AXLE CO.)



BALTIMORE GAS AND ELECTRIC COMPANY

Serving one of America's
Great Industrial Centers.

QUARTERLY DIVIDENDS

Dividends of \$1.12½ a share on the 4½% Preferred Stock, Series B; \$1.00 a share on the 4% Preferred Stock, Series C; and 45 cents a share on the Common Stock, have been declared for the quarter ending June 30, 1958, all payable July 1, 1958, to holders of record at the close of business on June 13, 1958.

J. THEODORE WOLFE, President

Dividends paid on Common Stock without
interruption or reduction since 1910.

AMPHENOL

AMPHENOL ELECTRONICS CORPORATION

At a meeting of the Board of Directors of Amphenol Electronics Corporation held today a quarterly dividend of thirty cents per share was declared, payable July 25, 1958, to the shareholders of record at the close of business July 11, 1958. The transfer books will not be closed.

Dated at Chicago June 24, 1958.

FRED G. PACE
Secretary & Treasurer

BOSTON EDISON COMPANY

Preferred Dividend

A quarterly dividend of \$1.06 per share has been declared, payable on the first day of August 1958 to holders of record at the close of business on July 21, 1958* of the Company's Cumulative Preferred Stock, 4.25% Series.

*The record date for this dividend has been fixed for the 21st day of July instead of the usual 10th day because the by-laws of the Company require that the record dates of all series of its Cumulative Preferred Stock shall be the same and it is anticipated that July 21, 1958 will be the record date for the first dividend, expected to be payable on August 1, 1958, on the proposed new series of Cumulative Preferred Stock when, as and if issued.

Common Dividend No. 277

A quarterly dividend of 70 cents per share on the Common Stock of the Company has been declared, payable on the first day of August 1958 to stockholders of record at the close of business on July 10, 1958.

Checks will be mailed from Old Colony Trust Company, Boston.

ALBERT C. McMENIMEN
Treasurer

Boston, June 23, 1958



Have **YOU** looked into **Holland** installment paper?

There are many sound and attractive reasons why more than 700 banks and financing companies are handling Holland installment loan paper on a non-recourse basis.

Consider these important facts, for example . . .

1. Holland is the world's largest installer of home heating equipment—the only furnace company that retails its equipment on a nationwide basis.
2. Holland controls the end use of its products because we maintain our own sales outlets.
3. Holland guarantees heating comfort and backs up that guarantee with performance.
4. More than 5,000 Holland men, in more than 400 factory branches and sub-branches offer 24-hour-a-day service to more than 21,000,000 customers.

A phone call to our local manager will give you full information about the availability of Holland paper for your bank. Call today!

HOLLAND

FURNACE COMPANY

World's Largest Installers of Home Heating Equipment
Main Office and Plants at
Holland, Michigan

American Metal Climax, Inc.

COMMON STOCK
Dividend No. 130

The Board of Directors has declared a dividend of Thirty cents (30¢) per share on the Common Stock payable June 2, 1958 to stockholders of record at the close of business on May 21, 1958.

D. J. DONAHUE,
Treasurer.

CONSOLIDATED NATURAL GAS COMPANY

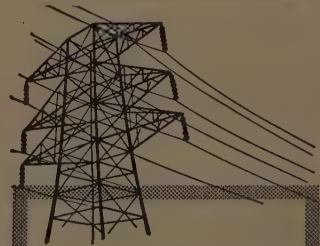
30 Rockefeller Plaza
New York 20, N. Y.

DIVIDEND No. 42

THE BOARD OF DIRECTORS has this day declared a regular quarterly dividend of Fifty Cents (50¢) per share on the capital stock of the Company, payable August 15, 1958 to stockholders of record at the close of business July 15, 1958.

R. E. PALMER, *Secretary*

June 25, 1958



Southern California Edison Company

DIVIDENDS

The Board of Directors has authorized the payment of the following quarterly dividends:

ORIGINAL PREFERRED STOCK
Dividend No. 196
60 cents per share;

CUMULATIVE PREFERRED STOCK,
4.32% SERIES
Dividend No. 45
27 cents per share.

The above dividends are payable June 30, 1958, to stockholders of record June 5. Checks will be mailed from the Company's office in Los Angeles, June 30.

P. C. HALE, *Treasurer*

May 15, 1958



Find out
what fun
a train can be



Go
Santa Fe

"The Chief way"
between Chicago and
California or Texas

For reservations, consult any Santa Fe
representative or travel agent.



DIAMOND GARDNER CORPORATION

77th CONSECUTIVE
YEAR OF DIVIDENDS

GROWING FOR THE FUTURE



MATCHES • CARTONS • PULP PRODUCTS • LUMBER • BUILDING SUPPLIES • WOODENWARE

The Board of Directors of Diamond Gardner Corporation on June 26, 1958, declared a regular quarterly dividend of 45c per share on the Common Stock. At the same meeting the Board also declared a quarterly dividend of 37½c per share on the \$1.50 Cumulative Preferred Stock. Both dividends are payable August 1, 1958 to stockholders of record July 7, 1958.

PERRY S. WOODBURY
Secretary and Treasurer

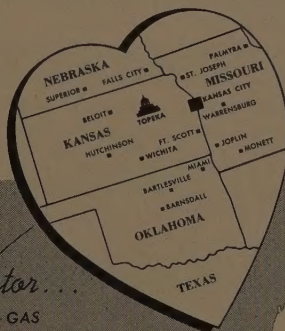
THERE ARE GREAT POTENTIALITIES IN THE HEART OF THE NATION

The area served by The Gas Service Company has a stable, diversified economy with a healthy balance between agriculture, industry and natural resources.

More than 3,000 manufacturers, many of the nation's largest, are located here. An indication of how this growth is continuing is reflected by the fact that industrial expansion in existing industries exceeded \$230,000,000 during 1957. There were 38 new industrial firms added to the Company's gas lines during the past year.

Prospects are the brightest in years for fine agricultural crops due to plentiful moisture and ideal growing conditions. Marketable livestock is in great abundance.

Nature has endowed this region with some 40 vital minerals required by American industry. Add to this the availability of an abundance of other natural resources such as natural gas, oil, coal, and water, and it is easy to see why there are great potentialities in the heart of the nation.



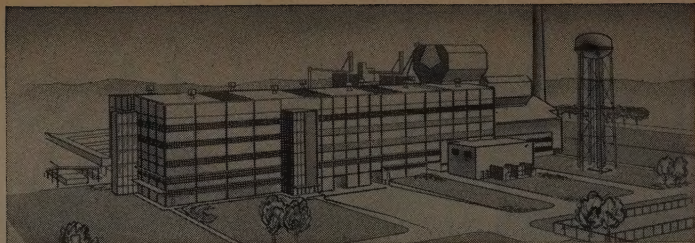
Distributor...
OF NATURAL GAS

TO MORE THAN 250 COMMUNITIES IN THE HEART OF THE NATION.

THE GAS SERVICE COMPANY

700 SCARRITT BLDG.

KANSAS CITY 42, MO.



What is happening

today at  will help contribute
to a better tomorrow

With sights set on the future, the Pittsburgh Plate Glass Company is moving ahead with its research, expansion and improvement programs. From research to merchandising, new facilities are being established to equip PPG for the increased sales which the expanding economy will create.

New research facilities—The nation's most advanced flat glass research center is being completed near Pittsburgh, Pa. An extensive chemical research center was recently opened at Barberton, Ohio, by PPG's subsidiary, Columbia-Southern Chemical Corp. A pilot plant for advanced work on paints and coatings is going into operation at Springdale, Pa.

New plants—Work on a new PENNVERNON® window glass plant at Decatur, Ill., is well under way. At Shelby, N.C., PPG's Fiber Glass Division is building a continuous yarn plant with a 25,000,000-pound-per-year capacity.

Improved products—Each of PPG's operating divisions has new or improved products. Advances are being made with SOLARGRAY® and SPANDRELITE®, glass building products important in curtain wall construction. A new foam product called SELECTROFOAM® is now being marketed in several types for insulating, soundproofing or cushioning. Progress is being made with such chemical products as HI-SIL®, a reinforcing pigment which makes colored tires and other colored rubber products practical.

New branches—To help move its growing lines of products to the hands of dealers, distributors and other customers, PPG is expanding its sales branches, and strengthening its technical sales staffs to meet the needs of today's complex technology.

Yes, in all its fields of activity, PPG is preparing for the expanded markets which America's growing population will create.



New Research Facilities



Improved Products

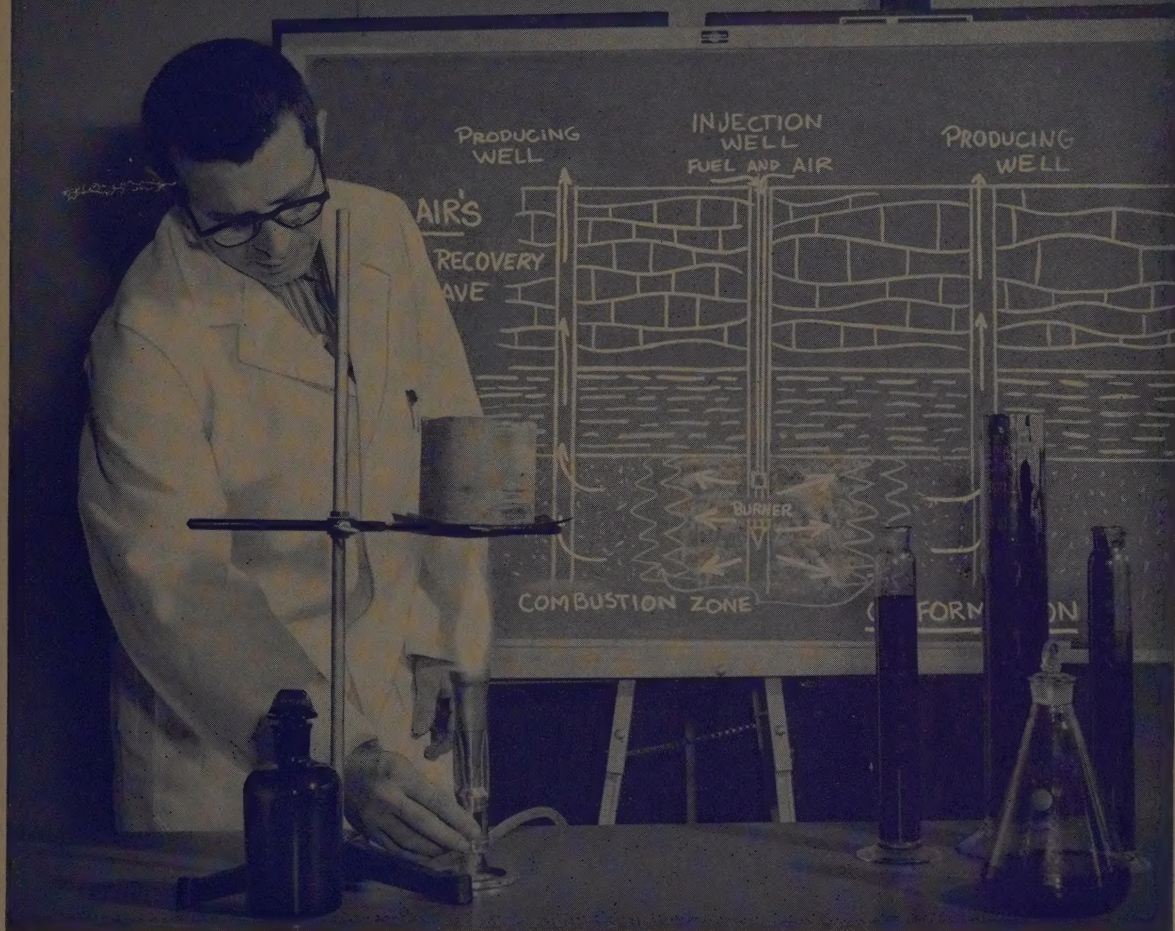


SYMBOL OF SERVICE FOR SEVENTY-FIVE YEARS
PITTSBURGH PLATE GLASS COMPANY
IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

New Branches



A MANAGEMENT REPORT



How Sinclair Increases Oil Recovery—With Fire



by WILLIAM H. MORRIS
President

SINCLAIR OIL & GAS COMPANY
a subsidiary of

"Crude oil is a stubborn material. It clings so tenaciously to the porous rock formation in which it's found that in many cases more than half of the oil is not recovered by conventional production methods. Now, however, Sinclair research engineers have learned how to use an ancient tool—fire—to pry out additional quantities of the oil left behind. A patented Sinclair 'heatwave' process starts a fire in the oil formation. Then, injections of gaseous fuel and air drive the fire through that formation, sweeping the oil to producing wells. Now undergoing commercial testing, this Sinclair research development promises much fuller utilization of the nation's oil resources and demonstrates our continuing technical leadership."

SINCLAIR OIL CORPORATION • 600 FIFTH AVE., NEW YORK 20, N.Y.

PULVIS PUTEOLANUS



Securities Investment

JUL 22 1958

It happened 2000 years ago . . .

Roman chariots raced over Roman roads carrying the banner of conquest to every corner of the known world . . . and an empire was born!

Rome reigned for over 400 years . . . largely on the strength of Caesar's legions and the fantastic durability of Pulvis Puteolanus.

It was Pulvis Puteolanus, that built the roads over which Rome rode to world conquest . . . the aqueducts that carried Roman water . . . the buildings that housed Roman nobles . . . and the bridges that spanned Roman rivers.

Pulvis Puteolanus . . . **CONCRETE!**

The discovery of concrete brought countless comforts and conveniences to ancient Rome. And today, after 2000 years of experiment and research, a new, scien-

tifically-tested-and-improved concrete is bringing even *more* comforts and conveniences to modern America.

Concrete is a remarkably durable and versatile material. Americans walk on it, ride on it, and, when they choose to fly, come back to earth on it. Americans work in concrete buildings and many millions live in concrete houses!

Pulvis Puteolanus in ancient Rome . . .
CONCRETE in modern America . . .

And then, as now, serving so many people in so many ways!

Concrete...Better In Every Way!

For Our Company Review

Write: "Review"

P. O. Box 420

Norfolk, Virginia

SOUTHERN MATERIALS CO., INC.



Headquarters: NORFOLK, VIRGINIA